UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

JUN 30 2000

MEMORANDUM TO: Bruce Morehead
Acting Director
Office of Sustainable Fisheries

FROM: Donald R. Knowles
Director
Office of Protected Resources

SUBJECT: ESA Section 7 Consultation on the Atlantic Pelagic Fisheries for Swordfish, Tuna, Shark and Billfish in the U.S. Exclusive Economic Zone (EEZ): Proposed Rule to Implement a Regulatory Amendment to the Highly Migratory Species Fishery Management Plan; Reduction of Bycatch and Incidental Catch in the Atlantic Pelagic Longline Fishery

The attached biological opinion addresses the potential effects of the Atlantic Pelagic Fisheries for Swordfish, Tuna, Shark and Billfish in the U.S. Exclusive Economic Zone (EEZ): Proposed Rule to Implement a Regulatory Amendment to the Highly Migratory Species Fishery Management Plan; Reduction of Bycatch and Incidental Catch in the Atlantic Pelagic Longline Fishery, on threatened and endangered species pursuant to section 7 of the Endangered Species Act of 1973, as amended (ESA). This opinion concludes that the proposed federal fishery and regulatory amendment is likely to jeopardize the continued existence of loggerhead sea turtles and leatherback sea turtles. It concludes that the proposed action is not likely to jeopardize the continued existence of other threatened or endangered species in the action area or designated critical habitat.

The biological opinion prescribes two reasonable and prudent alternatives that will avoid the likelihood of jeopardizing these listed sea turtles associated with the proposed action. The biological opinion includes an Incidental Take Statement that provides the fishery with an exemption to the take prohibitions established in section 9 of the ESA. Please note that the reasonable and prudent measures identified in the Incidental Take

Statement are non-discretionary and must be implemented for the section 9 exemption to apply.

We need to be certain that the fishery is conducted in a way that complies with these measures and we look forward to working with you to ensure compliance with the Reasonable and Prudent Alternatives and Incidental Take Statement.

Finally, please note that consultation on this fishery must be reinitiated if the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; new information reveals effects of the action that may affect listed species or critical habitat in a way not previously considered; the action is modified in a way that causes an effect to listed species that was not previously considered; or, a new species is listed or critical habitat is designated that may be affected by the action.

Attachment

Endangered Species Act - Section 7 Consultation
Biological Opinion

Agency: National Marine Fisheries Service, Office of Sustainable Fisheries

Activity: Reinitiation of Consultation on the Atlantic Pelagic Fisheries for Swordfish, Tuna, Shark and Billfish in the U.S. Exclusive Economic Zone (EEZ): Proposed Rule to Implement a Regulatory Amendment to the Highly Migratory Species Fishery Management Plan; Reduction of Bycatch and Incidental Catch in the Atlantic Pelagic Longline Fishery

Conducted By: National Marine Fisheries Service, Office of Protected Resources

Date Issued: JUN 30 2000

Contents

This document constitutes the National Marine Fisheries Service's (NMFS) biological opinion (Opinion) based on reinitiation of formal section 7 consultation on the implementation of NMFS' Office of Sustainable Fisheries, Fishery Management Plan (FMP) for Highly Migratory

Office of Sustainable Fisheries, Fishery Management Plan (FMP) for Highly Migratory Species (HMS), and its effects on threatened and endangered marine mammals and sea turtles in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). NMFS' Office of Sustainable Fisheries asked NMFS' Office of Protected Resources to reinitiate formal consultation on the fishery based on data that the number of loggerhead sea turtles incidentally taken in pelagic component of the HMS fishery had exceeded levels anticipated in the April 23, 1999, biological opinion. This document also constitutes the NMFS biological opinion on NMFS' Office of Sustainable Fisheries proposal to approve an Amendment to the FMP for Highly Migratory Species, which modifies the FMP in a manner that causes effects to listed species not considered in the April, 23, 1999, biological opinion.

This Opinion is based on information provided in the draft Supplemental Environmental Impact Statement on the Regulatory Amendment to the Atlantic Tunas, Swordfish, and Sharks Fishery Management Plan, the draft Technical Memorandum: "Using Time and Area Closures to Minimize Incidental Catch and Bycatch in U.S. Atlantic Pelagic Longline Fisheries"; bycatch data analyses conducted by the NMFS Southeast Fisheries Science Center, preliminary lists of alternatives, telephone conversations with NMFS' Office of Sustainable Fisheries , Highly Migratory Species (HMS) staff, and other sources of information. A complete administrative record of this consultation is on file in the NMFS Southeast Regional Office in St. Petersburg, Florida.

The HMS FMP integrates management of Atlantic tunas, swordfish, and sharks by combining management measures for the three species groups into one FMP. The proposed action would limit the fishery spatio-temporally, to reduce bycatch of under-sized target species and incidental catch of non-target species such as billfish.

Consultation History

For almost two decades, the fisheries that will be considered in this Opinion have undergone numerous formal and informal section 7 consultations. The consultations, which are summarized below, collectively covered all components of the Atlantic pelagic fishery, including the pelagic driftnet, set gillnet, pelagic longline, bottom longline, purse seine and hand (hook and line, handline and harpoon) gear in the western Atlantic, Caribbean and Gulf of Mexico. These consultations include:

- A July 23, 1982**,** informal consultation on the 1985 South Atlantic Fishery Management Council (SAFMC) FMP for Atlantic swordfish
- A September 25, 1987, informal consultation on the Billfish FMP
- A September 7, 1989, informal consultation on the initial draft Secretarial Shark FMP
- A February 27, 1990, informal consultation on Amendment 1 to SAFMC FMP for Atlantic swordfish, amendment eventually withdrawn when management authority was transferred to the Secretary.
- A September 23, 1991, formal consultation on fishing conducted under the Final Secretarial Shark FMP of 1991 which concluded with a no jeopardy and Biological Opinion.
- A December 09, 1991, formal consultation to address recommendations of the International Convention for the Conservation of Atlantic Tunas (November 1990) regarding the driftnet and

longline components of the swordfish fishery, which concluded with a no jeopardy and Biological Opinion.

- A July 02, 1992, formal consultation on fishing activities conducted under proposed rule for the Atlantic bluefin tuna fishery, which concluded with a "no jeopardy" Biological Opinion.
- A January 14, 1994, informal consultation on regulatory changes for the 1994 Atlantic bluefin tuna fishery.
- A June 30, 1995, informal consultation on regulatory changes for the 1995 Atlantic bluefin tuna fishery.
- A September 01, 1995, reinitiated formal consultation on the longline and harpoon components of the directed swordfish fishery, which concluded with a "no jeopardy" Biological Opinion.
- A February 02, 1996, reinitiated formal consultation on the driftnet component of the directed swordfish fishery and the driftnet component of the shark fishery, which concluded with a "no jeopardy" Biological Opinion.
- A May 29, 1997, formal consultation on all components of the pelagic fishery (except billfish), which concluded with a "jeopardy" Biological Opinion. This jeopardy conclusion was primarily based on concerns regarding future lethal take of right whales in the northeast swordfish driftnet fishery, and the southeast shark gillnet fishery as well. In response to the conclusion of this Opinion, and in consideration of several other fishery management concerns, NMFS permanently closed the Northeast Swordfish driftnet fishery by regulation on January 27, 1999.
- An August 29, 1997, informal consultation to amend the May 29, 1997, Opinion to assess a new Reasonable and Prudent Alternative to allow for drift gillnet fishing for swordfish between August 1 to October 31, annually, between the Hudson Canyon and the Hague line.
- A July 10, 1998, informal consultation to amend the May 29, 1997, Opinion to revise the incidental take statement (clarifying the percent observer coverage needed in the shark gillnet fishery outside of right whale season).
- An August 05, 1998, informal consultation Amending the May 29, 1997 Biological Opinion to Consider New Quotas in the South Atlantic Swordfish Pelagic Longline Fishery.
- An April 23, 1999, formal consultation on the Atlantic Pelagic Fisheries for Swordfish, Tuna, Shark and Billfish Proposed Rule to Implement the Final Highly Migratory Species Fishery Management Plan. The resulting Opinion concluded that the continued operation of HMS fisheries was not likely to jeopardize the continued existence of any species under NMFS purview, including right whales, assuming that the reasonable and prudent alternatives to avoid jeopardizing the continued existence of the right whale in the previous (May 29, 1997) jeopardy opinion were fully implemented. This Opinion also concluded that HMS fisheries were likely to lethally and non-lethally take large numbers of threatened and endangered sea turtles and identified several reasonable and prudent measures with terms and conditions to minimize the effects of the anticipated take of those listed turtles.
- On November 19,1999, NMFS' Office of Sustainable Fisheries (Division of Highly Migratory Species Management) asked NMFS' Office of Protected Resources (Southeast Region) to reinitiate formal section 7 consultation on an early draft of the proposed HMS FMP Amendment. Since that time, the action proposed by HMS has undergone revisions which are currently being drafted as an Interim Final Rule; a proposed rule to implement the proposed Amendment was published in the Federal Register; and a Draft Supplemental Environmental

Impact Statement was prepared for the initial Proposed Rule, and filed with the Environmental Protection Agency on December 15, 1999.

- On February 28, 2000, the Division of Highly Migratory Species Management provided the Office of Protected Resources with a memorandum that clarified their request for consultation and provided information on probable management measures that would be contained in the Final Supplemental Environmental Impact Statement outlining measures for the Interim Final Rule (which was provided on April 20, 2000).
- On May 26, 2000, the Division of Highly Migratory Species Management provided a memorandum that indicated that NMFS was adding VMS as a viable alternative to the 100% observer coverage required for the southeast shark gillnet fishery as a reasonable and prudent alternative to jeopardy to right whales in the May 28, 1997, Opinion. A new section 7 consultation was also required because the fishery had exceeded the amount of leatherback and loggerhead turtles that were expected to be taken in the fishery. On May 31, 2000, the Division of Highly Migratory Species Management provided the Office of Protected Resources with a draft copy of the Final Supplemental Environmental Impact Statement.

This Opinion will consider the effects of implementation of the Interim Final Rule, as described in the proposed rule dated December 15, 1999 and subsequently amended as outlined in supplementary materials recently provided by HMS, to be incorporated into the draft Interim Final Rule, based on comments received regarding the proposed rule.

Compliance with Past Requirements under Previous Consultations

As part of the April 23, 1999, Opinion on this fishery, NMFS reviewed its record of complying with the reasonable and prudent alternatives and reasonable and prudent measures of the May 1997, jeopardy biological opinion. While NMFS had implemented many of the requirements, some of the reasonable and prudent alternatives to avoid jeopardy to right whales or reasonable and prudent measures to minimize the effects of take to sea turtles had not been implemented. In this Opinion, we have revisited NMFS' compliance with these requirements. Based on that review, we conclude that some of these reasonable and prudent alternatives and reasonable and prudent measures have not been implemented. A complete analysis of what requirements have and have not been implemented is provided in Appendix 1; a brief summary follows below.

One of the most important requirements that still has not been implemented is NMFS' failure to fully fund and implement an observer program for the southeast shark gillnet fishery, or implement an alternative monitoring program that is as effective as observers. The 1998-1999 right whale calving season was fully observed, but for the 1999/2000 season, NMFS exhausted their funding for this reasonable and prudent alternative to avoid the likelihood of jeopardizing right whales approximately 6 weeks before the required time period ended in March 2000. Fishers reported 7 trips subsequent to the termination of the observer program. We could not determine if additional trips went unreported or if there was any incidental take of any protected species associated with these unobserved trips. VMS as an alternative to the 100% observer requirement does not address the need to monitor incidental take levels, as well to collect biological data. Of greatest concern in this regard is the failure to collect data that could be used to determine which subpopulation loggerhead sea turtles caught in the pelagic longline fishery come from.

Other terms and conditions which were not being fully implemented at the time of the April 23, 1999, Opinion are now in compliance. For example, workshops with the shark gillnet fishermen to provide information on sea turtle handling and resuscitation guidelines have been conducted, as has the reasonable and prudent measure of the Opinion requiring that regulations be promulgated to require that setting of gear in this fishery is prohibited within 3 nm of a listed whale sighting, that if a whale is sighted within that range, nets or lines must be hauled back immediately, and that if any listed whale is taken in gear, the vessel operator must contact NMFS (nearest Regional Office) and cease all fishing activities immediately. NMFS also implemented the requirement, under a reasonable and prudent alternative of the May 29, 1997, Opinion to issue regulations implementing a requirement that all shark driftnet gear be attached to the vessel at one end (tended). This was accomplished via a May 1999 Rule implementing the HMS FMP.

II. Description of the Proposed Action

The National Marine Fisheries Service proposes to continue implementing fisheries pursuant to the Highly Migratory Species Fisheries Management Plan and to approve a new regulatory amendment to the FMP (the proposed rule, as modified following public review and comment, and additional analyses, is outlined in section II. 3, below). NMFS proposes to take this action under the authority of the Magnusson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 *et seq*.).

NMFS also proposes to issue a proposed rule that would require shark fishers in the gillnet fishery to use VMS during the critical right whale season, in lieu of the reasonable and prudent alternative of 100% observer coverage during the same season, to avoid jeopardy to right whales. Specifically, from November 15 to April 1 for vessels operating in the area from West Palm Beach (26°46.5' N latitude) to Sebastian Inlet, Florida (27°51 N latitude), VMS units (meeting specifications to be defined in an upcoming rule) would be installed and operational on all shark gillnet vessels. This requirement would ensure that fishers do not enter the closed area (unless accompanied by an observer, as allowed if fishers elected to strike net for sharks). Additionally, all shark gillnet/strikenet fishermen must continue to inform the NMFS' Southeast Regional Office, St. Petersburg, Florida, regarding planned trips *at least 48 hours* prior to fishing. NMFS will also ensure that if a vessel does not have either an observer or working VMS, *then that vessel will not fish*. Allowing VMS as an alternative to observer coverage does not preclude the requirement to monitor the fishery at a statistically reliable level to evaluate the effect of the fishery on sea turtles, including appropriate seasonal coverage.

In 1999, the pelagic longline component of the HMS fisheries for swordfish and tuna greatly exceeded the number of loggerhead and leatherback sea turtles that were expected to be taken in the fishery. Because incidental take was exceeded, section 7 consultation had to be reinitiated. Specifically, the incidental take statement anticipated the following levels of incidental take:

(a) 690 leatherback sea turtles (*Dermochelys coriacea*), entangled or hooked (annual estimated number) of which no more than 11 are observed hooked by ingestion or moribund when released.

(b) 1541 loggerhead sea turtles (*Caretta caretta*) entangled or hooked (annual estimated number); of which no more than 23 may be hooked by ingestion or observed moribund when released.

Preliminary analyses of partial observer records from 1999 indicate that up to 50 loggerheads and 19 leatherbacks were observed "hooked by ingestion" or moribund upon release, which already exceeds the anticipated levels for this criteria (i.e. observed hooked by ingestion or observed moribund upon release) and indicated a need to re-evaluate take levels and measures to reduce these levels. Extrapolated data for 1999 are not currently available, so it is not possible at this time to determine whether or not total anticipated take levels were exceeded (see further discussion in the "effects of the action" section below). Additional information received on May 18, 2000, during the conduct of this consultation indicates that past estimates of incidental take evaluated in the April 23, 1999, Opinion have been underestimated by as much as 50%.

1. Description of Current HMS Fisheries under existing FMP

Total (preliminary) reported U.S. catch of tuna and tuna-like fishes (including swordfish, but excluding other billfishes) in 1998 was 26,631 MT. This represents a decrease of 2,883 MT (10% decrease) from 1997. Estimated swordfish catch (including estimated dead discards) decreased 185 MT to 3,655 MT, and provisional landings from the U.S. fishery for yellowfin in the Gulf of Mexico decreased in 1998 to 2,006 from 2,634 in 1997. The estimated 1998 Gulf of Mexico landings of yellowfin accounted for 36% of the estimated total U.S. yellowfin landings in 1998. U.S. vessels fishing in the northwest Atlantic landed an estimated 1,234MT of bluefin, a decrease of 99 MT compared to 1997. Provisional skipjack landings increased by 21 MT to 105 MT from 1997 to 1998, estimated bigeye landings decreased by 208 MT compared to 1997 to an estimated 928 MT in 1998, and estimated albacore landings increased from 1997 to 1998 by 249 MT to 830 MT.

The fisheries for highly migratory species have been described extensively in both the draft and final FMPs and in previous consultations as noted above; these descriptions are incorporated herein by reference. Definitions of the various gear-types used in HMS fisheries are provided in Appendix II. Recreational fisheries for all HMS managed species groups also exist. Collectively, these fisheries are prosecuted throughout the U.S. Atlantic EEZ (i.e., the Action Area) and beyond (Fig. 1., below). Updated information including the latest effort data available follows below. These HMS fisheries include fisheries targeting swordfish, tuna, bluefin tuna, sharks, and billfish, as described below.

a. Swordfish Fishery

The North Atlantic swordfish fishery is a managed unit occurring throughout the Atlantic Ocean north of 5° N latitude in the western portion of the north Atlantic, including the north Atlantic Ocean west of approximately 42° W longitude. Swordfish are primarily taken by pelagic longline, with minimal catches by harpoon, handline, and rod and reel. The swordfish pelagic driftnet fishery was recently prohibited under a separate regulation. Five hundred seventy-three vessels were permitted to land swordfish as of March 23, 2000, although only 244 of these permit directed longline fishing for swordfish, with another 123 permitted for directed swordfish fishing with handgear. A handful of these vessels fish in the South Atlantic Ocean (south of 5º N latitude). Over the years 1993-1996, between 4,074 and 4,551 metric tons of swordfish were either landed or caught and discarded. In 1998 and 1999, the United States was limited to 29% of the North Atlantic TAC, which is a base quota of 2,398.6 mt dw. The pelagic longline fishery operates year-round in all pelagic waters of the U.S. EEZ and beyond (see Fig. 2 below), and currently accounts for approximately 98% of the U.S. domestic swordfish landings.

Incidental catches by fishing gears other than pelagic longline and handgear are restricted to incidental commercial retention limits of two to five swordfish per trip depending on gear type, and are counted against the incidental catch quota. Incidental landings are made by otter trawl vessels fishing for squid, mackerel and butterfish (the primary prey species sought by swordfish).

b. Atlantic Tuna Fishery (other than bluefin)

Target species for the Atlantic tuna fishery include yellowfin, bigeye, north Atlantic albacore, and Atlantic skipjack. The management unit and fishing activity for these species extend across Federal, and in some cases, state and international jurisdictional boundaries encompassing 25°W below the equator and 5°N of the equator. The directed fisheries for Atlantic tunas are limited by regulation to pelagic longline, rod and reel, handline, harpoon, bandit gear, and purse seine nets. The May 28, 1999 final rule implementing the HMS FMP prohibited the use of pelagic driftnets for targeting tuna. In 1999, there were 22,967 vessels permitted to participate in Atlantic tuna fisheries, including 6,827 General category vessels, 13,147 Angling category vessels, 2,457 Charter/Headboat category vessels, 450 pelagic longline vessels, 48 Harpoon category vessels, and 5 Purse seine vessels. Total landings in all regions by all gear types combined ranged from 5,199.3 to 8,131.3 metric tons between 1993 and 1996. Of the tuna landings reported in the FMP, yellowfin tuna was by far the dominant species by weight landed. The pelagic longline fishery accounted for between 36% and 65% of the total U.S. Atlantic yellowfin tunas landed, by weight. The rod and reel fishery landed between 27% and 63% , with all other gear types combined accounting for between 1 and 8 % over the 1993-1996 time period.

c. Bluefin Tuna Fishery

West Atlantic bluefin tuna occur from Labrador and Newfoundland south into the Gulf of Mexico and Caribbean Sea and also off Venezuela and Brazil. The management boundaries are west of 45°W longitude above 10°N and at 25°W below the equator, with an eastward shift in the boundary between those parallels. The commercial fishery includes primarily handgear (rod and reel, harpoon, kegline, and handline) and purse seine vessels, and is primarily focused in the mid-Atlantic and New England.

While targeting bluefin, the purse seiners operate primarily out of New Bedford and Gloucester. These vessels operate in New England waters typically east and southeast of Massachusetts, from mid August through September.

U.S. vessels fishing in the northwest Atlantic (including the Gulf of Mexico) in 1998 landed an estimated 1,234 MT of bluefin tuna and discarded dead an estimated 67 MT (total 1,301 MT). About 20% (248 MT annual average) of this is landed by purse seine vessels.

In 1998, 240 bluefin tuna were landed incidentally to other fishing operations, primarily in longline fisheries targeting yellowfin tuna and swordfish. Bluefin tuna landed in the incidental category averaged 439 lbs in 1998, down from 448 lbs in 1997, and 539 lbs in 1996. Bluefin tuna were landed by 100 Incidental category permit holders in 1998. In 1998, only eight percent of those vessels landing under the Incidental category landed more than five fish. Target catch requirements on the incidental catch of bluefin tuna are intended to remove any incentive to target these bluefin tuna while minimizing dead discards. The annual U.S. allowance for dead discards is currently 68 mt. If there are dead discards in excess of this allowance, they must be counted against the following year's quota. If there are fewer dead discards, then half of the underharvest may be added to the following year's quota while the other half is conserved.

d. Shark Fishery

The directed shark fishery is managed as five species groups: large coastal sharks (12 species), small coastal sharks (4 species), pelagic sharks (5 species), prohibited sharks (19 species) and deepwater/other sharks (33 species). The directed fisheries for Atlantic sharks include bottom longline, shark gillnet, and rod and reel gear, and are located primarily in the southeastern United States and Gulf of Mexico. Sharks are also caught in pelagic longline gear but the majority of these are caught incidental to other fishing operations, although this gear is sometimes used to target porbeagle and mako sharks.

The FMP states that nearly all Atlantic shark fishermen operate in the multispecies longline fishery. In an effort to rebuild these overfished stocks, in 1997 NMFS reduced the overall commercial quota 50% to 1,285 mt for the LCS group, established a 1,760 mt quota for the small coastal species (SCS) group, and maintained the commercial quota for the pelagic species group at 550 mt.

The final FMP described a limited access program for commercial shark and swordfish fishermen which was implemented on July 1, 1999. As of March 23, 2000, there were 280 directed shark commercial permits and 598 incidental shark commercial permits.

The May 1999 regulations implementing the HMS FMP would have further reduced commercial quotas for sharks, but due to a court order resulting from a lawsuit challenging these quotas, their implementation is currently on hold, and the 1997 quotas are still being used in the interim.

The 1999 Shark Evaluation Annual Report indicates that estimates of 1997 landings of large coastal, pelagic, and small coastal sharks (which were preliminary at the time the HMS FMP was prepared) have been finalized, and provides preliminary estimates of 1998 landings: 2,058 mt dw of large coastal sharks; 228 mt dw of pelagic sharks; and 287 mt dw of small coastal sharks. Notable revisions indicate that LCS landings in 1997 were approximately 400 mt dw higher than previously reported, and that landings in 1998 were approximately 249 mt dw higher than the final 1997 estimates. Additionally, these landings represent a 16 mt dw decrease of pelagic sharks, and a 33 mt dw decrease of small coastal sharks from 1997 final estimates. The 1999 *Shark Evaluation Annual Report* states that:

> "Updated catches in numbers for 1997 are estimated to be higher than previously reported because complete landings statistics were not available at the time the original estimates were derived. Catches in numbers for 1998 are estimated to be about 14% higher than 1997 catches. Catch levels higher than the established quota in 1997 and 1998 are attributable to state landings after season closures, and Louisiana is the state with the highest landings."

A gillnet fishery for sharks is prosecuted mainly off the southern tip of Georgia and down the Florida Atlantic coast to approximately the West Palm Beach area. According to Florida Department of Environmental Protection trip ticket data, landings in this fishery were 468.6 mt (LCS, SCS and pelagic species combined) in 1997 and 409.6 mt in 1998. These data include bycatch landings, primarily from the Spanish mackerel fishery. No shark gillnet landings data are available from Georgia, although this is believed to represent a small fraction of the effort that takes place off the Florida coast.

Carlson and Lee (1999) provided information on catch and bycatch in the shark drift gillnet fishery off east Florida during the 1998/1999 critical right whale season (November 15 - March 31) indicating that a total of 20 sets on 20 known vessel trips caught an estimated 2,923 animals. The catch consisted of 12 species of sharks, 21 species of teleosts and rays, and one species of marine mammal. Two species of sharks, blacktip and finetooth, made up 90 percent by number and 73 percent by weight of the observed shark catch (see below). Bycatch was dominated by crevalle jack, Spanish mackerel, tarpon, cobia, king mackerel, spotted eagle ray, and menhaden.

According to the HMS division, a group of fishers (n •6) in Alabama are working to begin a shark gillnet fishery off the coast of that state, using 8" -12" mesh and ≥ 2,000 yards of net. If this fishery does develop, there is little potential for interaction with listed whales, due to their rare occurrence in the Gulf (with the exception of sperm whales, which could be impacted if the fishery is prosecuted far enough offshore or the occasional whale strays into coastal waters – especially as the DeSoto canyon area, as noted earlier, is a "hot spot" for this species). However, sea turtles would likely be impacted at some unquantifiable level. Thus far, the fishery is operating only in state waters and therefore would fall under the purview of this FMP only if the vessel owner has been issued a Limited Access Permit to participate in the shark fishery in federal waters.

e. Billfish

The management unit for the billfish fishery includes: blue and white marlin in waters north of 5°N latitude in the North Atlantic, including the Gulf of Mexico and the Caribbean; sailfish in waters of the North and South Atlantic Oceans, including the Gulf of Mexico and the Caribbean west of 30°W longitude; and longbill spearfish in waters of the entire Atlantic Ocean, including the Gulf of Mexico and the Caribbean. The fishery is recreational only with rod-and-reel gear and currently, no permit is required. The fishery is concentrated from Massachusetts to North Carolina, southeast Florida, northern Gulf of Mexico, and the Caribbean. Billfish caught in commercial fisheries must be discarded. Since 1988, annual discards, on average, have been approximately 150 mt of Atlantic blue marlin and 80 mt of Atlantic white marlin. Annual recreational landings of Atlantic blue marlin have been reduced since 1988 by approximately 73% relative to pre-management levels (1980-1988); annual white marlin recreational landings have declined by approximately 90% over the same time.

2. Incorporation of Take Reduction Plans into the Scope of the Action

There are two take reduction plans which affect HMS fisheries - the Atlantic Large Whale Take Reduction Plan (ALWTRP), which was implemented via a rule published February 16, 1999 (64 FR 7529) and the Atlantic Offshore Cetacean Take Reduction Plan (AOCTRP), which was submitted to NMFS by the Take Reduction Team (TRT) on November 25, 1996, but has not yet been fully implemented.

The ALWTRP addresses the shark gillnet component of the HMS fisheries. Measures to prevent potential interaction between right whales and this fishery include: closure of the Southeast U.S. right whale critical habitat and adjacent area (approximately Savannah, GA to Sebastian, FL) to all gillnet gear during the calving season (November 15 - March 31) when whale distribution may coincide with the fishery (with exemption for strike gillnet gear under certain specified conditions); a 100% observer requirement from November 1 to March 31 for anyone fishing outside the closed area (to the east or south) but between Savannah, GA and approximately West Palm Beach, FL or fishing with strikenet gear inside the closed area; and gear marking requirements. These requirements were previously effected under MMPA regulations implementing the ALWTRP. The HMS FMP adopted these regulations under authority of the Magnuson-Stevens Act, to ensure regulatory consistency. While developing the original proposed TRP, TRT members agreed that VMS (vessel monitoring system) was a viable alternative to observers, but fishers were unwilling to agree to this as a requirement due to the cost. In subsequent meetings, fishers have indicated a willingness to carry the devices and incorporate VMS as part of the TRP, although they have expressed the opinion that NMFS should cover the costs of implementing this if it is made a requirement.

In cases where an observer's primary purpose is to monitor whether vessels fish within closed areas, VMS is considered a viable alternative to observers because these devices can transmit data remotely, via satellite, to report information (depending upon degree of sophistication of the device selected) such as time/location, movements, time of sets and haulbacks, and sea surface temperature. VMS can therefore allow NMFS to monitor compliance with closures, conditions on time of sets/haulbacks, duration of sets, temperature of sets, etc. Although one reason NMFS initially believed observers provided a reasonable and prudent alternative to jeopardy to right whales in the shark gillnet fishery was that in the unlikely event of an interaction, an observer would ensure contact with the disentanglement network and thus increase the odds of the animal's survival, the main reason for the 100% observer requirement was to ensure implementation of the time/area closure. Because the possibility of the shark gillnet fishery encountering a right whale outside the closed area is quite remote and because VMS offers an alternative method of monitoring the closure requirement, NMFS believes it to be an effective substitute for observers for these purposes (although observers still must monitor at some level for potential takes of other listed species, especially sea turtles).

The AOCTRP, as submitted to NMFS by the Take Reduction Team (TRT), provided take reduction measures for the pair trawl fishery, the pelagic drift gillnet fishery, and the pelagic longline fishery for swordfish, tuna and shark. The pair trawl fishery (which was an experimental fishery) has not been authorized to operate since 1995, and the pelagic driftnet fishery was closed under the May 28, 1999 rule implementing the HMS FMP (a previous rule published January 27, 1998 closed the fishery to swordfish (64 FR 4055), while the May 1999 rule prohibits the use of this gear type in targeting tuna in pelagic waters). The take reduction measures proposed in the TRT's Plan largely focused on the mid-Atlantic and northeast coastal areas, where marine mammal bycatch was highest. These measures include reducing the length of the line to 24 nm (as a means of effort reduction) in the Mid-Atlantic, retrieving the gear in reverse of the order set to decrease soak time, moving fishing location after one marine mammal interaction (because of the contagious distribution of protected species bycatch noted in the observer data base), limited entry, increasing observer coverage, education/outreach workshops to increase awareness of marine mammal bycatch problems with the fishery and encourage proper techniques for disentanglement/release, and enhancing communication between fishermen. The Team also recommended, to prevent future expansion of the fishery into presently unexploited areas, closure of right whale critical habitats during seasons when right whales would likely be present, and additionally, recommended research on acoustic deterrent devices.

The May 28, 1999, final rule implementing the HMS FMP incorporates the TRT's recommendations to: move after an interaction; limit the length of longlines in the Mid-Atlantic Bight to 24 nm for one year (to assess its utility at marine mammal bycatch reduction); and limited entry. With respect to conducting fisherman education/outreach, NMFS' Office of Protect Resources and Division of Highly Migratory Species Management jointly decided that the education/outreach component of the rule should be made voluntary on a two-year trial basis, in hopes that this approach would be more effective than if the program were mandatory. This is in keeping with the recommendations of the TRT. However, further outreach workshops have not been conducted, but it is hoped that TRT outreach coordinators in both the northeast and southeast will be able to work more closely with fishermen to fill this void. NMFS' Office of Sustainable Fisheries decided against the recommendation to retrieve gear in reverse order, due to human safety concerns. However, this measure is allegedly (and according to vessel tracklines monitored via VMS in the Hawaii longline fleet) practiced by several fishermen in the longline fishery currently, thus it is unclear whether implementation of this strategy would have been effective in reducing levels of protected species bycatch. Therefore, it is unlikely that NMFS' decision not to implement this recommendation from the AOCTRT will greatly alter the overall effectiveness of the suite of take reduction strategies recommended by the TRT.

NMFS' Office of Sustainable Fisheries, in consultation with the Office of Protected Resources, determined that the right whale critical habitat closure proposed under the AOCTRP would more appropriately be implemented under the MMPA. Provided the closure was implemented under the MMPA within a reasonable time-frame, NMFS' April 23, 1999, biological opinion indicated that, there would be no difference in terms of the level of protection afforded if this course of action was taken rather than including this provision under the HMS FMP. NMFS Office of Protected Resources, however, still has not addressed this issue. Because currently longline fishing generally doesn't take place in right whale critical habitat areas, this is not a great concern. However, the TRT made this a condition of the TRP in order to avoid potential for future expansion of HMS fisheries into such habitat areas. Because possible effort shifts resulting from the proposed closures could potentially direct effort into these currently non-use areas, this possibility is now of some concern, and this provision should be addressed sometime in the near future.

The final TRT recommendation, that of increasing observer coverage, would certainly provide more accurate data on levels of protected species bycatch, but more information is necessary to determine whether better precision of protected species bycatch estimates could be achieved at a reasonable cost in this large fleet. The remaining recommendations of the TRP not implemented by HMS are non-regulatory in nature and would best be accomplished via outreach.

3. Changes to the Regulations Proposed in the Draft Final Rule

Bycatch and incidental catch of undersized swordfish, Atlantic billfish (marlins and sailfish), turtles, marine mammals, and other non-target species, by pelagic longline gear has been a major concern for several years. The fact that several of these bycatch species are overfished — and protected species have been adversely affected — has heightened the need for an effective, rational management strategy to reduce pelagic longline bycatch. In 1997, the National Marine Fisheries Service (NMFS) began addressing this issue through the development of the draft HMS Fishery Management Plan (FMP) for swordfish, sharks and tunas, and Atlantic Billfish FMP amendment. The draft FMPs were completed in October 1998, with a proposed rule published on January 20, 1999 (63 FR 57093). On May 28, 1999, NMFS published a consolidated final rule (64 FR 29090) implementing the April 1999 Final HMS FMP, and Final Amendment One of the Atlantic billfish FMP. The HMS FMP contained actions to reduce bycatch in Atlantic pelagic longline fisheries, including a limited access program for Atlantic sharks, swordfish, and tunas which reduced the number of vessels that are permitted to land Atlantic swordfish, sharks, and tunas with pelagic longline from over 1,000 to approximately 450 vessels. Management measures also included a closure of a portion of the mid-Atlantic Bight for the month of June to reduce bluefin tuna discards.

The bycatch reduction strategy outlined in these management plans indicated that additional measures would subsequently be developed, including consideration of gear modifications and time/area closures. NMFS deferred implementation of the proposed Florida Straits time/area closure for protection of undersized swordfish and billfish until further analyses of the impacts of effort redistribution, and increased effectiveness with temporal and/or spatial expansion of the time/area management window. Further rationale for the delay was the potential magnitude of the economic and social impacts that would likely result from a more extensive time/area closure. Although management of bycatch in the pelagic longline fishery with time/area closures were delayed, the HMS FMP did implement a vital component of effective time/area management by requiring all commercial vessels employing pelagic longline gear to have a NMFS-approved vessel monitoring system (VMS). A joint HMS and Atlantic Billfish Advisory Panel (AP) meeting was held in June 1999 to discuss potential effectiveness of various bycatch reductions methods.

On December 15, 1999 (64 FR 69982), NMFS published a proposed rule to close an additional 196,000 square miles of the U.S. exclusive economic zone (EEZ) to pelagic longline fishing along the Gulf of Mexico and southeastern U.S. Atlantic coast. A Draft Supplemental Environmental Impact Statement (DSEIS) was published in concert with the proposed rule. A detailed discussion was provided describing a suite of management options considered, including: no action (i.e., status quo on all regulations impacting the pelagic longline fishery); prohibition of pelagic longline gear; four time/area closure scenarios (four areas in the Gulf of Mexico and four areas in the Southeastern U.S. Atlantic coast were examined in the draft Technical Memorandum); prohibition of the use of live bait; several alternatives to reduce turtle interactions (related to depth of hooks, water temperature and time of day); requiring use of circle hooks; reduction of soak time; and limit access to further reduce fishing effort in the Atlantic pelagic longline fishery. The overarching objectives in developing and selecting the preferred alternatives for the proposed rule were to maximize the reduction of finfish bycatch, minimize the reduction in the target catch of swordfish and other species, and minimize the impact on the incidental catch of other species (e.g., turtles and marine mammals).

The preferred alternatives for the proposed rule were based on the best available scientific, social and economic information, and were selected as those that would best achieve these objectives. The preferred alternatives identified in the proposed rule to close the western Gulf of Mexico (March through September) and a year-round closure along the southeastern U.S. Atlantic coast would have substantial economic impacts on a significant number of industry participants, as outlined in the Regulatory Impact Review and Initial Regulatory Flexibility Analysis. Economic effects would spread beyond the vessel owners, and affect crew members, bait and tackle suppliers, and wholesalers.

As a result of public comment and additional analyses conducted by NMFS, the closure areas in the proposed rule have been changed in the draft final rule. While the proposed rule used the best available science to focus on reducing bycatch and incidental catches of HMS and other overfished and/or protected species, the final rule must address concerns regarding minimizing the economic and social impacts of wide-ranging time area closures on business and communities directly involved with the fishery (e.g., vessel owners, captain, crew, seafood dealers) and supporting the fishery (bait and tackle, ice, fuel, dockage, etc.). The final actions must also be consistent with the rebuilding strategies developed in the HMS FMP and Amendment One of the Atlantic Billfish FMP, as balanced with the effective range of management actions relative to the range of these highly migratory species.

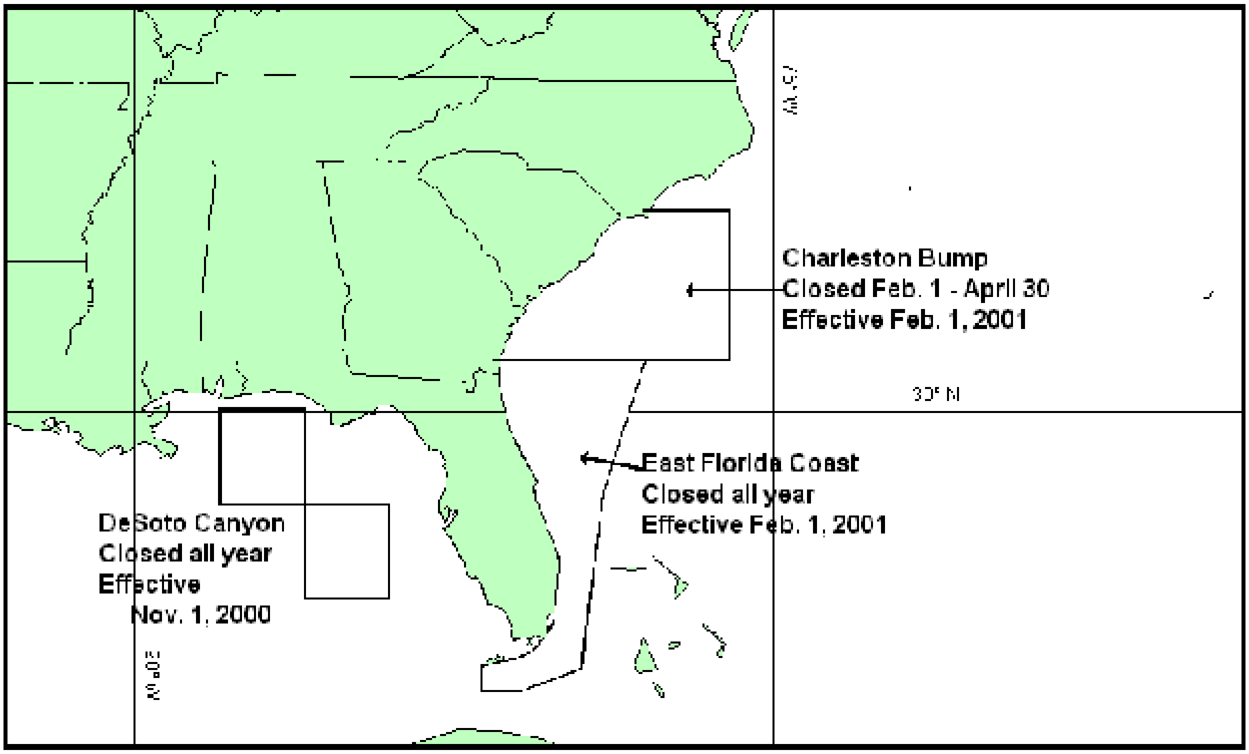

Figure 1. Gulf of Mexico and South Atlantic Closure Areas for the Pelagic Longline Fishery.

NMFS examined additional informational sources following suggestions received during the comment period that provided insight into the relationship between use of live bait and rates of marlin and sailfish discards. These analyses indicate that blue and white marlin occur approximately twice as frequently, on average, on pelagic longline gear utilizing live bait than those using dead bait; sailfish occur four to five times more frequently on live bait sets. According to the available data, prohibiting use of live bait should be just as effective in reducing sailfish discards (approximately 15 percent reduction from the Atlantic-wide U.S. totals during 1995 to 1998) as the western Gulf closure. The live bait prohibition would be less effective at reducing marlin bycatch discards than the March to September area closure (e.g., blue marlin: 3.3% vs. a 7.2% reduction under the displaced effort model). This necessitated a modified closure of the fishery in the Gulf, to be implemented in concert with a Gulf-wide prohibition on the use of live bait (because live bait is only used by a small community of fishers operating in the Gulf of Mexico, it is unnecessary to extend this prohibition elsewhere).

Gulf of Mexico Closure: Two areas located in proximity to the DeSoto Canyon area in the northeastern Gulf of Mexico (see Fig. 1) were noted to historically have high ratios of swordfish discards to swordfish kept, which at times approached or exceeded more swordfish being discarded then kept (by number). Over the past six years, fishing effort and landings of swordfish in the northeastern Gulf of Mexico have been reduced by nearly 50 percent; however, year-round closure of the approximately 32,000 square nautical mile area will have a greater impact on reducing swordfish discards than the 96,000 square nm western Gulf closure originally proposed. In addition, it is likely that closures along the east Florida coast would otherwise displace effort to the northeastern Gulf. If these DeSoto Canyon areas are not closed, fishing effort and subsequent discard of swordfish may dramatically increase.

South Atlantic Closure: Six alternative time/area closures were examined using the non-displacement and displacement models described in the DSEIS, to determine potential impacts of the various closure scenarios. The objective of this exercise was to identify a spatial and/or temporal subset of the proposed rule's preferred alternative that was effective in reducing bycatch, but minimized social, economic and community impacts. A year-round closure of the area south of 31°N latitude (the "Florida Atlantic closure area") and a February through April closure of the area to the north of this (from 31°N - 34° N latitude; i.e., the "Charleston Bump" closure area) (see Fig. 2) yielded results similar to the proposed preferred alternative, with generally less then a 2 percent change of effectiveness, under both the non-displacement and displacement models. Therefore, these areas combined were selected as the revised South Atlantic closure area for the draft Final Rule.

Summary**:** In summary, the proposed regulations are to (1) close the Florida Atlantic to longline fishing year-round, and the "Charleston Bump" area from February - April; (2) close the DeSoto Canyon area of the Gulf of Mexico to longline fishing year-round; and (3) prohibit the use of live bait for pelagic longline fishers in the Gulf of Mexico. This Opinion will evaluate the continued implementation of the existing FMP, the effects of the proposed regulatory amendment on the fishery, and the addition of VMS as an alternative to 100% observer coverage, in light of new information regarding significant underestimates of previously determined incidental take levels, and reports that levels of incidental take that were anticipated in the April 23, 1999, Opinion, had been exceeded.

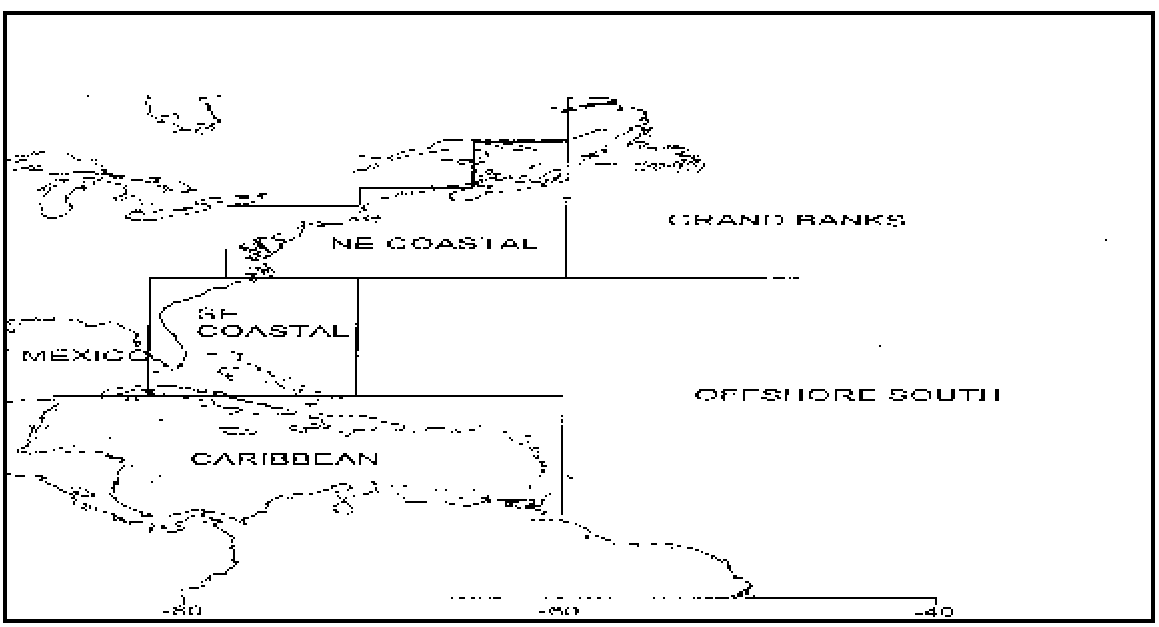

Figure 2. NMFS Statistical Areas for the Pelagic Longline Fishery for Swordfish, Tuna and Sharks.

4. *Action Area*

Collectively, HMS fisheries are prosecuted throughout the U.S. Atlantic EEZ (i.e., the Action Area) and beyond. Fig. 2. depicts the statistical sampling areas used for reporting of HMS catch (excluding sharks) to the International Convention for the Conservation of Atlantic Tunas .

III. Status of Listed Species and Critical Habitat

The following listed species under the jurisdiction of NMFS are known to occur in the pelagic waters of the North Atlantic Ocean and Gulf of Mexico:

Endangered	
Blue whale	*Balaenoptera musculus*
Humpback whale	*Megaptera novaeangliae*
Fin whale	*Balaenoptera physalus*
Northern right whale	*Eubalaena glacialis*
Sei whale	*Balaenoptera borealis*
Sperm whale	*Physeter macrocephalus*
Leatherback sea turtle	*Dermochelys coriacea*
Hawksbill sea turtle	*Eretmochelys imbricata*
Green turtle	*Chelonia mydas*[1]
Kemp's ridley sea turtle	*Lepidochelys kempii*

Threatened	
Loggerhead sea turtle	*Caretta caretta*

Critical Habitat Designations
Right Whale [western north Atlantic Stock]

1. Biology and Distribution

Of the species expected to be present in the action area, only right, humpback, fin and sperm whales and the five sea turtle species are known to become entangled in gillnet and other fishing gear (although direct evidence of gillnet entanglement in some fisheries, such as the multispecies sink gillnet fishery, the Mid-Atlantic coastal gillnet fishery, the SEUS shark gillnet fishery and the pelagic driftnet fishery for swordfish, tuna and shark, is available through observer programs, such evidence often is recorded from animals observed at sea or stranded either with gear or with net marks, and is thus not fishery specific). The species known to interact with pelagic longline gear include loggerhead, leatherback, hawksbill, green, and Kemp's ridley sea turtles (and a few anecdotal accounts of entanglements with humpback whales). This section will focus on the status information within the Action Area necessary to

[1] *Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.*

establish the environmental baseline and to assess the effects of the proposed action. In some cases, this information comes from sea sampling data from vessels known to be targeting HMS species.

Background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents. General information on the potential for entanglement in the gear types used in HMS fisheries is likely to be similar to that summarized in previous consultations on the HMS fisheries as noted above, as well as consultations on the Multispecies FMP, including the June 12, 1986, November 30, 1993, February 18, 1996, and December 13, 1996 (NMFS 1996a) Biological Opinions and the December 21, 1998 monkfish BO. Additional sources include recent sea turtle status documents (NMFS and USFWS 1995, USFWS 1997), Recovery Plans for the humpback whale (NMFS 1991a), right whale (NMFS 1991b), loggerhead sea turtle (NMFS and USFWS 1991) and leatherback sea turtle (NMFS and USFWS 1992), the status reports on Kemp's ridley and loggerhead sea turtles provided by the Marine Turtle Expert Working Group (EWG, 1998 and in prep.) and the 1998 marine mammal stock assessment report (Waring *et al.* 1999). Summary information on the biology of these species is provided below. Additional background information on these two species was provided in the species accounts section of the May 29, 1997 BO and is incorporated herein by reference.

Right Whale

Right whales have occurred historically in all the world's oceans from temperate to subarctic latitudes. NMFS recognizes three major populations of right whales: North Pacific, North Atlantic, and Southern Hemisphere. NMFS further recognizes two extant subpopulations in the North Atlantic: eastern and western. A third subpopulation may have existed in the central Atlantic (migrating from east of Greenland to the Azores or Bermuda), but this stock appears to be extinct (Perry *et al.* 1999). Because of our limited understanding of the genetic structure of the entire species, the most conservative approach to this species would treat these right whale subpopulations as distinct populations whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood that one or more of these subpopulations would survive and recover in the wild would appreciably reduce the species' likelihood of survival and recovery in the wild. Consequently, this biological opinion will focus on the western north Atlantic population of right whales, which occurs in the action area.

The scarcity of right whales is the result of an 800-year history of whaling that continued into the 1960s (Klumov 1962). Of all of the large whales, the northern right whale has the highest risk of extinction in the near future. Recent data indicate that there are an estimated 300 individuals in the North Atlantic and a small, unknown number of individuals in the North Pacific. The southern right whale, in contrast, has shown signs of slow recovery over the past 20 years. Illegal takes by Soviet whaling fleets operating in the North Pacific and Southern Hemisphere are now known to have continued until as recently as 1980 (Zemsky *et al*. 1995). Northern right whales have been protected for more than 50 years from the pressures of whaling, yet most stocks show no evidence of recovery.

Right whales appear to prefer shallow coastal waters, but their distribution is also strongly correlated to the distribution of their prey (zooplankton). In both northern and southern hemispheres, right whales have been observed in the lower latitudes and more coastal waters during winter, where calving takes place, and then tend to migrate to higher latitudes during the summer. In summer and fall in both hemispheres, the distribution of right whales appears linked to the distribution of their principal zooplankton prey (Winn *et al*.1986). The western north Atlantic stock of right whales generally occurs in Northwest Atlantic waters west of the Gulf Stream and are most commonly associated with cooler waters (≤ 21°C). They are not found in the Caribbean and have been recorded only rarely in the Gulf of Mexico.

NMFS designated right whale critical habitat on June 3, 1994 (59 FR 28793). These waters, which lie within the action area, include the waters of Cape Cod Bay and the Great South Channel off the coast of Massachusetts, and off the coasts of southern Georgia and northern Florida, where the species is concentrated at different times of the year. Whales are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990; Schevill *et al.* 1986; Watkins and Schevill 1982), in the Great South Channel in May and June (Kenney *et al.* 1986, Payne *et al.* 1990), and off Georgia/Florida from mid-November through March (Slay *et al.* 1996). Right whales also frequent the Bay of Fundy, Browns and Baccaro Banks (in Canadian waters), Stellwagen Bank and Jeffrey's Ledge in the spring and summer months, and use mid-Atlantic waters as a migratory pathway between the winter calving grounds and their spring and summer nursery/feeding areas in the Gulf of Maine. During the winter of 1999/2000, appreciable numbers of right whales were recorded in the Charleston, SC area. Because survey efforts in the mid-Atlantic have been limited, it is unknown whether this is typical or whether it represents a northern expansion of the normal winter range, perhaps due to unseasonably warm waters. However, historical sighting data uncorrected for effort do show a concentration of sightings in this area. In addition, recent satellite tracking efforts have identified individual animals embarking on far-ranging foraging episodes not previously known (Knowlton, pers. comm.).

Right whales in the Gulf of Maine feed on zooplankton, primarily copepods, by skimming at or below the water's surface with open mouths (see NMFS 1991b, Kenney *et al.* 1986, Murison and Gaskin 1989, Mayo and Marx 1990).

Since NMFS issued the 1997 Biological Opinion on HMS fisheries, there has been significant discussion regarding attempts to determine the current status and trend of this very small population and to make valid recommendations on recovery requirements. As reported in the 1997 Biological Opinion, Knowlton *et al*. (1994) concluded, based on data from 1987 through 1992, that the western North Atlantic right whale population was growing at a net annual rate of 2.5% (CV = 0.12). This rate was also used in NMFS' marine mammal Stock Assessment Reports, e.g., Blaylock *et al*. 1995, Waring *et al.* 1997. Since then, the data used in Knowlton *et al.* (1994) have been re-evaluated, and new attempts to model the trends of the western North Atlantic right whale population have been published (e.g., Kraus 1997; Caswell *et al*. 1999) and additional works are in progress (Caswell *et al.*, in prep.; Wade and Clapham, in prep).

Recognizing the precarious status of the right whale, the continued threats present in its coastal habitat throughout its range, and the uncertainty surrounding attempts to characterize population trends, the International Whaling Commission (IWC) held a special meeting of its Scientific Committee from March 19-25, 1998, in Cape Town, South Africa, to conduct a comprehensive assessment of right whales worldwide. The workshop's participants reviewed available information on the northern right whale, including Knowlton *et al.* (1994), Kraus (1997), and Caswell *et al.* (1999). After considering this information, the workshop attendees concluded that it is unclear whether the western North Atlantic subpopulation of the right whale is "declining, stationary or increasing, and [that] the best estimate of current population size is only 300 animals." Maintaining a conservative stance due to these uncertainties, participants concluded that the growth rate of this population "is both low and substantially less than that of the southern right whale populations" (IWC, 1998).

The IWC Workshop participants expressed "considerable concern" in general for the status of the Western North Atlantic population. Based on recent (1993-1995) observations of near-failure of calf production, the significantly high mortality rate, and an observed increase in the calving interval, it was suggested that the slow but steady recovery rate published in Knowlton *et al.* (1994) may not be continuing. Workshop participants urgently recommended increased efforts to determine the trajectory of the this right whale population, and NMFS' Northeast Fisheries Science Center has initiated several efforts to implement that recommendation.

Caswell *et al.* (1999), using data on reproduction and survival through 1996, determined that the western North Atlantic right whale population was declining at a rate of 2.4% per year. One model they used suggested that the mortality rate of the right whale population has increased five-fold in less than one generation. According to Caswell *et al.* (1999), if the mortality rate as of 1996 does not decrease and the population performance does not improve, extinction could occur within 100 years and would be certain within 400 years, with a mean time to extinction of 191 years.

It should be noted that no information is currently available on the response of the right whale population to recent (1997-1999) efforts to mitigate the effects of entanglement and ship strikes. Therefore, it is not possible to determine whether the trend through 1996, as reported in Caswell *et al.* (1999), is continuing. Furthermore, results reported in Caswell *et al.* (1999) suggest that it is not possible to determine that anthropogenic mortalities alone are responsible for the decline in right whale survival. However, they conclude that reduction of anthropogenic mortalities would significantly improve the species' survival probability. Given the uncertainty regarding effects of natural phenomena such as demographic and environmental stochasticity, which can influence the northern right whale population -- and assuming that the right whale population, is in fact, declining -- it is impossible to determine whether the western North Atlantic right whale population has reached the point where it would continue to decline even if all human-induced mortalities ceased.

At the 1998 IWC workshop, an inter-sessional Steering Group was established to review Caswell *et al.* (1999) and several other ongoing assessment efforts to identify the best and most current available scientific information on population status and trends. The IWC Scientific Committee met in May 1999 and discussed the Steering Group's report. Committee members noted that there were several potential negative biases in Caswell *et al.* (1999) but agreed that the results of the study should be considered in management actions.

For the purposes of this Biological Opinion -- and until the new status and trend information has been thoroughly reviewed for assimilation into NMFS management programs -- NMFS will continue to adopt the risk averse assumption that the northern right whale population is declining.

General human impacts and entanglement

The major known sources of anthropogenic mortality and injury of right whales include entanglement in commercial fishing gear and ship strikes. Right whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries.

Based on photographs of catalogued animals from 1959 and 1989, Kraus (1990) estimated that 57% of right whales exhibited scars from entanglement and 7% from ship strikes (propeller injuries). This work was updated by Hamilton *et al.* (1998) using data from 1935 through 1995. The new study estimated that 61.6% of right whales exhibit injuries caused by entanglement, and 6.4 % exhibit signs of injury from vessel strikes. Hamilton *et al.* (1998) also reported that the increase in entanglement scarring since 1989 is a significant trend which is not attributable to increases in sighting effort or population size. In addition, several animals have apparently been entangled on more than one occasion. Some right whales that have been entangled were subsequently involved in ship strikes. These scarring percentages are primarily based on sightings of free-swimming animals that initially survive the impact which resulted in the scar. Because some animals may drown or be killed immediately, the actual number of interactions may be slightly higher. Following is a summary of recent documented cases of human interaction.

Many of the reports of mortality cannot be attributed to a particular source. The following deaths or injuries were reported between 1996 and 1999 (these numbers should be viewed as absolute minimum numbers; the total number of deaths and injuries cannot be estimated):

1996: one right whale was killed by a ship strike, a second right whale was killed by a ship after having been entangled in 1995. In addition to these mortalities, there were two confirmed reports of right whales becoming entangled in fishing gear.

1997: another right whale was killed by a ship strike in the Bay of Fundy, and there were 8 confirmed reports of whale entanglements. Six of the entanglements were reported in Canadian waters and 2 in U.S. waters; it should be noted that we only know where 2 of the 8 entanglements occurred (one in U.S. and one in Canadian waters), and one of the reports may represent a resighting of an earlier entanglement.

1998: 2 adult female right whales were discovered in a weir off Grand Manan Island in the Bay of Fundy on July 12, 1998, and were released two days later; no residual injuries of concern were reported. On July 24, 1998, the Disentanglement Team removed line from around the tail stock of a right whale which was originally seen entangled in the Bay of Fundy on August 26, 1997. This same whale, apparently debilitated from the earlier entanglement, became entangled in lobster pot gear twice in one week in Cape Cod Bay in September 1998. The gear from the latter two entanglements was completely removed, but line from the 1997 entanglement remained in the animal's mouth. On August 15, 1998, a right whale was observed entangled in the Gulf of St. Lawrence; the animal apparently freed itself of most of the gear, but some gear may remain.

1999: Two right whale mortalities were documented, including an adult female found floating near Truro, Massachusetts, that was towed to the beach for necropsy. Based on the necropsy, scientists concluded that the whale died from complications resulting from injuries caused by a ship strike. In the fall, a second adult female died of complications caused by entanglement.

Four new right whale entanglements were confirmed in 1999. There were several attempts to disentangle two of the whales. A whale sighted in the Bay of Fundy in June was nearly completely disentangled; a small piece of line remains in the mouth.

2000: This year there has been one right whale mortality to date. A whale identified as #2701 was found floating dead 10 miles SE of Block Island, RI on 1/19/00. Although entangling gear (line) was seen around the tail stock, cause of death is uncertain. NMFS was unable to retrieve the carcass for examination due to extreme winter storms.

Several right whale entanglements have been reported in 2000 thus far as well, but disentanglement personnel have met with little success in relocating/disentangling these animals so it is unclear how many animals are involved.

The available information makes it reasonable to conclude that the current death rate far exceeds the birth rate in the western North Atlantic right whale population. The nearly complete reproductive failure in this population from 1993 to 1995 and again in 1998 and 1999 suggests that this pattern has continued for almost a decade. Because no population can sustain a high death rate and low birth rate for long without becoming extinct, this combination places the North Atlantic right whale population at high risk of extinction. Coupled with an increasing calving interval, the relatively large number of adult, female right whales that are killed, and these human-related deaths, the right whale's probability of extinction in the next 100 years is very high.

Humpback Whale

Humpback whales feed in the northwestern Atlantic during the summer months and migrate to calving and mating areas in the Caribbean. Five separate feeding areas are utilized in northern waters after their return; one of which, the Gulf of Maine feeding population, lies within U.S. waters and is within the action area of this consultation. Most of the humpbacks that forage in the Gulf of Maine visit Stellwagen Bank and the waters of Massachusetts and Cape Cod bays. Sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffreys Ledge (CeTAP 1982), and peak in May and August. Small numbers of individuals may be present in this area year-round, including the waters of Stellwagen Bank.

Katona and Beard (1990) summarized information gathered from a catalogue of photographs of 643 individuals from the western North Atlantic population of humpback whales. These photographs indicated reproductively mature western North Atlantic humpbacks winter in tropical breeding grounds in the Antilles, primarily on Silver and Navidad Banks, north of the Dominican Republic. The primary winter range also includes the Virgin Islands and Puerto Rico (see NMFS, 1991). In general, it is believed that calving and copulation take place on the winter range. Calves are born from December through March and are about 4 meters at birth. Sexually mature females give birth approximately every 2 to 3 years. Sexual maturity is reached between 4 and 6 years of age for females and between 7 and 15 years for males. Size at maturity is about 12 meters.

Swingle *et al*. (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months. Those whales using this mid-Atlantic area that have been identified were found to be residents of the Gulf of Maine feeding group, suggesting a shift in distribution that may be related to winter prey availability. Studies conducted by the Virginia Marine Science Museum indicate that these whales are feeding on, among other things, bay anchovies and menhaden. Researchers theorize that juvenile humpback whales, which are unconstrained by breeding requirements that result in the migration of adults to relatively barren Caribbean waters, may be establishing a winter foraging area in the mid-Atlantic (Mayo pers. comm.). In concert with the increase in mid-Atlantic whale sightings, strandings of humpback whales have increased between New Jersey and Florida since 1985. Strandings were most frequent during September through April in North Carolina and Virginia waters, and were composed primarily of juvenile humpback whales of no more than 11 meters in length (Wiley *et al*. 1995). Six of 18 humpbacks (33 percent) for which the cause of mortality was determined were killed by vessel strikes. An additional humpback had scars and bone fractures indicative of a previous vessel strike that may have contributed to the whale's mortality. Sixty percent of those mortalities that were closely investigated showed signs of entanglement or vessel collision (Wiley *et al*. 1993).

Since the 1997 Opinion, on HMS, new information has become available on the status and trends of the humpback whale population, although there are still insufficient data to determine population trends for the Western North Atlantic stock (Waring *et al.* 1997). The current rate of increase of the North Atlantic humpback whale population has been estimated at 9.0% (CV=0.25) by Katona and Beard (1990) and at 6.5% by Barlow and Clapham (1997). Palsboll *et al*. (1997) studied humpback whales through genetic markers to identify individual humpback whales in the northern Atlantic Ocean. Using breeding ground samples from 1992–1993, Palsboll *et al*. (1997) estimated the North Atlantic humpback whale population at 4,894 (95% confidence interval 3,374 - 7,123) males and 2,804 females (95% confidence interval 1,776 4,463), for a total of 7,698 whales. However, since the sex ratio in this population is known to be 1:1 (Palsboll *et al*., 1997), the lower figure for females is presumed to be a result of sampling bias or some other cause for partitioning of the sampling.

Photographic mark-recapture analyses from the YONAH (Years of the North Atlantic Humpback) project gave an ocean-basin-wide estimate of 10,600 (95% c.i. = 9,300 - 12,100) and an additional genotype-based analysis yielded a similar but less precise estimate of 10,400 (95% c.i. = 8,000 - 13,600) (Smith *et al*. 1999). The estimate of 10,600 is regarded as the best available estimate for this population. The minimum population estimate for the North Atlantic humpback whale population is 10,019 animals (CV=0.067) (Waring *et al.* 1999).

The Northeast Fisheries Science Center recommended that NMFS identify the Gulf of Maine feeding stock as the management stock for this population in U.S. waters, although a population estimate for the Gulf of Maine portion of the population is not available at this time. Stock identity of the juveniles found in the Mid-Atlantic is also unknown at this time. The NEFSC is funding a study to determine stock identity of these individuals. The results from this work will assist NMFS in determining whether multiple management units are necessary for the U.S. East Coast.

General human impacts and entanglement

The major known sources of anthropogenic mortality and injury of humpback whales include entanglement in commercial fishing gear and ship strikes. Humpback whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries.

Based on photographs of the caudal peduncle of humpback whales, Robbins and Mattila (1999) estimated that at least 48% -- and possibly as many as 78% -- of animals in the Gulf of Maine exhibit scarring caused by entanglement. Several animals have apparently been entangled on more than one occasion. These estimates are based on sightings of free-swimming animals that initially survive the scarring encounter. Because some animals may drown immediately, the actual number of interactions may be slightly higher. Following is a summary of recent documented cases of human interaction.

Many of the reports of mortality cannot be attributed to a particular impact source. The following injury/mortality events are those reported from 1996 to the present for which impact source was determined. These numbers should be viewed as absolute minimum numbers; the total number of mortalities and injuries cannot be estimated but is believed to be higher. In 1996, 3 humpback whales were killed in collisions with vessels and at least 5 were seriously injured by entanglement in the same year. Three confirmed humpback whale entanglements were reported in 1997. Stranding records from January through December 1997 for the U.S. Atlantic coast include seven stranded/dead floating humpback whales. Two of these mortalities were attributed to ship strikes. For 1998, 14 confirmed humpback whale entanglements resulting in injury (n=13) or mortality (n=1) were reported. One of the animals with entanglement injuries stranded dead, but the role of the entanglement in the whale's death has not been determined. Three of the injured animals were completely disentangled, one partially disentangled, one partially disentangled and later shed the remaining gear, and one shed the gear without assistance from the Disentanglement Team. One injury from a vessel interaction was reported in 1998; the whale was seen several times after the injury, which exhibited some healing. Three incidents of dead floating humpback whales were also reported in 1998; however, cause of death has not been determined for any of these animals. Nine humpback entanglements were reported to the Center for Coastal Studies whale disentanglement team in 1999, including one mortality. This does not include Canadian entanglements.

Fin Whale

The fin whale is ubiquitous in the North Atlantic and occurs from the Gulf of Mexico and Mediterranean Sea northward to the edges of the arctic ice pack (Waring *et al*. 1999). The overall pattern of fin whale movement is complex, consisting of a less obvious north-south pattern of migration than that of right and humpback whales. Based on acoustic recordings from hydrophone arrays, however, Clark (1995) reported a general southward "flow pattern" of fin whales in the fall from the Labrador/Newfoundland region, south past Bermuda, and into the West Indies. The overall distribution may be based on prey availability. This species preys opportunistically on both invertebrates and fish (Watkins *et al.* 1984). As with humpback whales, they feed by filtering large volumes of water for the associated prey. Fin whales are larger and faster than humpback and right whales and are less concentrated in nearshore environments. Due to these traits, fin whales are less prone to entanglements than are right and humpback whales, but because they do occur in many of the same areas, the potential exists.

Hain *et al.* (1992) estimated that about 5,000 fin whales inhabit the northeastern United States continental shelf waters. Shipboard surveys of the northern Gulf of Maine and lower Bay of Fundy targeting harbor porpoise for abundance estimation provided an imprecise estimate of 2,700 (CV=0.59) fin whales (Waring *et al.* 1997).

General human impacts and entanglement

Of 18 fin whale mortality records collected between 1991 and 1995, four were associated with vessel interactions, although the proximal cause of mortality was not known. In 1996, three reports of ship strikes were received, although this was only confirmed as cause of death for one of the incidents. One entanglement report was received in 1996.

At least five reports of entangled fin whales were received by NMFS in 1997. Four fin whales were reported as having stranded in the period from January 1, 1997, to January 1, 1998, in the Northeast Region; the cause of death was not determined for these animals. One ship strike mortality was documented in 1998 in the Virginia-North Carolina border area. One entanglement mortality was reported in September 1998. Three entanglements were reported to the Center for Coastal Studies disentanglement team in 1999.

Sperm Whale

There are estimated to be approximately two million sperm whales worldwide with a population of 130,000 or more thought to occur in the North Atlantic (IWC 1983). In the western North Atlantic they range from Greenland to the Gulf of Mexico and the Caribbean. The sperm whales that occur in the eastern US EEZ are believed to represent only a portion of the total stock (Blaylock *et al*. 1995). Sperm whales generally occur in waters greater than 180 meters in depth. While they may be encountered almost anywhere on the high seas their distribution shows a preference for continental margins, sea mounts, and areas of upwelling, where food is abundant (Leatherwood and Reeves 1983). Waring *et al*. (1993) suggest sperm whale distribution is closely correlated with the Gulf Stream edge. Like swordfish, which feed on similar prey, sperm whales migrate to higher latitudes during summer months, when they are concentrated east and northeast of Cape Hatteras. Bull sperm whales migrate much farther poleward than the cows, calves, and young males. Because most of the breeding herds are confined almost exclusively to warmer waters many of the larger mature males return in the winter to the lower latitudes to breed.

Sperm whale sightings recorded from the NOAA vessel Oregon II from 1991 - 1997 are concentrated just beyond the 100 m depth contour in the northern Gulf of Mexico, east of the Mississippi River Delta. Recent studies conducted jointly by researchers from NMFS and Texas A&M indicate that these offshore waters are an important area for Gulf sperm whales. In fact, researchers with Texas A & M believe that the area should be considered as critical habitat for sperm whales (R. Davis, pers. comm.), as it is the only known breeding and calving area in the Gulf, for what is believed to be an endemic population.

Sperm whales feed primarily on medium to large-sized mesopelagic squids *Architeuthis* and *Moroteuthis*. Sperm whales, especially mature males in higher latitude waters, also take significant quantities of large demersal and mesopelagic sharks, skates, and bony fishes (Clarke 1962, 1980). Sperm whale populations are organized into two types of groupings: breeding schools and bachelor schools. Older males are often solitary (Best 1979). Breeding schools consist of females of all ages and juvenile males. The mature females ovulate April through August in the Northern Hemisphere. During this season one or more large mature bulls temporarily join each breeding school. A single calf is born at a length of about 4 meters after a 15 month gestation period. A mature female will produce a calf every 3-6 years. Females attain sexual maturity at the mean age of nine years and a length of about nine meters. Males have a prolonged puberty and attain sexual maturity at about age 20 and a body length of 12 meters. Bachelor schools consist of maturing males who leave the breeding school and aggregate in loose groups of about 40 animals. As the males grow older they separate from the bachelor schools and remain solitary most of the year (Best 1979).

Sperm whales were hunted in America from the 17th century through the early 1900's. The International Whaling Commission estimates that nearly a quarter-million sperm whales were killed worldwide in whaling activities between 1800 and 1900 (IWC 1971). With the advent of modern whaling the larger rorqual whales were targeted. However as their numbers decreased, greater attention was paid to smaller rorquals and sperm whales. From 1910 to 1982 there were nearly

700,000 sperm whales killed worldwide from whaling activities (Clarke 1954; Committee for Whaling Statistics 1959 -1983). In recent years the catch of sperm whales has been drastically reduced as a result of the imposition of catch quotas. NMFS believes there are insufficient data to determine population trends for this species (Blaylock *et al.* 1995).

Because of their generally more offshore distribution and their benthic feeding habits, sperm whales are less subject to entanglement than are right or humpback whales. Sperm whales have been taken in the pelagic driftnet fishery for swordfish, and could likewise be taken in the shark gillnet fishery on occasions when they may occur more nearshore, although this likely does not occur often. Also, interactions between sperm whales and longlines for sable fish have been noted in Alaska waters.

Loggerhead turtle (*Caretta caretta*)

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and are the most abundant species of sea turtle occurring in U.S. waters. Loggerhead sea turtles concentrate their nesting in the north and south temperate zones and subtropics, but generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (NRC 1990). The largest known nesting aggregation of loggerhead sea turtles occurs on Masirah and Kuria Muria Islands in Oman (Ross and Barwani 1982). In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. The best scientific and commercial data available on the genetics of loggerhead sea turtles suggests there are four major subpopulations of loggerhead sea turtles in the northwest Atlantic: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29º N; (2) a south Florida nesting subpopulation, occurring from 29º N on the east coast to Sarasota on the west coast; (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; and (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990). This biological opinion will focus on the northwest Atlantic subpopulations of loggerhead sea turtles, which occur in the action area.

Although NMFS has not completed the administrative processes necessary to formally recognize populations or subpopulations of loggerhead sea turtles, these sea turtles are generally grouped by their nesting locations. Based on the most recent reviews of the best scientific and commercial data on the population genetics of loggerhead sea turtles and analyses of their population trends (TEWG, 1998; TEWG in prep), NMFS treats these loggerhead turtle nesting aggregations as distinct sub- populations whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species' likelihood of survival and recovery in the wild. Consequently, this biological opinion will focus on the four nesting aggregations of loggerhead sea turtles identified in the preceding paragraph (which occur in the action area) and treat them as subpopulations for the purposes of this analysis. Natal homing to the nesting beach provides the genetic barrier between these subpopulations, preventing recolonization from turtles from other nesting beaches. The importance of maintaining these subpopulations in the wild is shown by the many examples of extirpated nesting assemblages in the world.

The loggerhead sea turtles in the action area are likely to represent differing proportions of the four western Atlantic subpopulations. Although the northern nesting subpopulation produces about 9 percent of the loggerhead nests, they comprise more of the loggerhead sea turtles found in foraging areas from the northeastern U.S. to Georgia: between 25 and 59 percent of the loggerhead sea turtles in this area are from the northern subpopulation (Bass *et al*., 1998; Norrgard, 1995; Rankin-Baransky, 1997; Sears 1994, Sears *et al.* 1995). About 10 percent of the loggerhead sea turtles in foraging areas off the Atlantic coast of central Florida are from the northern subpopulation (Witzell *et al*., in prep). In the Gulf of Mexico, most of the loggerhead sea turtles in foraging areas will be from the South Florida subpopulation, although the northern subpopulation may represent about 10 percent of the loggerhead sea turtles in the gulf (Bass pers. comm). In the Mediterranean Sea, about 45 - 47 percent of the pelagic loggerheads are from the South Florida subpopulation and about 2% are from the northern subpopulation, while only about 51 percent originated from Mediterranean nesting beaches (Laurent *et al.* 1998). In the vicinity of the Azores and Madiera Archipelagoes, about 19 percent of the pelagic loggerheads are from the northern subpopulation, about 71 percent are from the South Florida subpopulation, and about 11 percent are from the Yucatán subpopulation (Bolten *et al*., 1998).

Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years. Turtles in this life history stage are called "pelagic immatures" and are best known from the eastern Atlantic near the Azores and Madeira and have been reported from the Mediterranean as well as the eastern Caribbean (Bjorndal *et .al*. in press). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm SCL they recruit to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico.

Benthic immatures have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico (R. Márquez-M., pers. comm.). Large benthic immature loggerheads (70-91 cm) represent a larger proportion of the strandings and in-water captures (Schroeder *et al.* 1998) along the south and western coasts of Florida as compared with the rest of the coast, but it is not known whether the larger animals actually are more abundant in these areas or just more abundant within the area relative to the smaller turtles. Benthic immature loggerheads foraging in northeastern U.S. waters are known to migrate southward in the fall as water temperatures cool (Epperly *et al.* 1995; Keinath 1993; Morreale and Standora 1999; Shoop and Kenney 1992), and migrate northward in spring. Given an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985; Frazer and Limpus 1998), the benthic immature stage must be at least 10-25 years long.

Although loggerhead sea turtles are most vulnerable to pelagic longlines during their pelagic, immature life history stage, there is some evidence that benthic immatures may also be captured, injured, or killed by pelagic fisheries. Recent studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic immatures, followed by permanent settlement into benthic environments. Some may not totally circumnavigate the north Atlantic. In addition, some of these turtles may either remain in the pelagic habitat in the north Atlantic longer than hypothesized or they may move back and forth between pelagic and coastal habitats (Witzell in prep.). Any loggerhead sea turtles that follow this developmental model would be adversely affected by shark gill nets and shark bottom longlines set in coastal waters, in addition to pelagic longlines.

Adult loggerhead sea turtles have been reported throughout the range of this species in the U.S. and throughout the Caribbean Sea. As discussed in the beginning of this section, they nest primarily from North Carolina southward to Florida with additional nesting assemblages in the Florida Panhandle and on the Yucatán Peninsula. Non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea; however, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season. Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

Based on the data available, it is not possible to estimate the size of the loggerhead sea turtle population in the U.S. or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage. Nesting data collected on index nesting beaches in the U.S. from 1989-1998 represent the best dataset available to index the population size of loggerhead sea turtles. Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,016-89,034 annually, representing, on average, an adult female population of 44,780 [(nests/4.1) * 2.5]. On average, 90.7% of the nests were from the South Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle subpopulation. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation they belong. There are only an estimated 3,700 nesting females in the northern loggerhead subpopulation, and the status of this population is officially documented as stable at best (TEWG in prep.).

From a global perspective, the southeastern U.S. nesting aggregation is critical to the survival of this species: it is second in size only to the nesting aggregations in the Arabian Sea off Oman and represents about 35 and 40 percent of the nests of this species. The status of the Oman nesting beaches has not been evaluated recently, but they are located in a part of the world that is vulnerable to extremely disruptive events (e.g. political upheavals, wars, and catastrophic oil spills), the resulting risk facing this nesting aggregation and these nesting beaches is cause for considerable concern (Meylan *et al*. 1995).

Loggerhead sea turtles face a number of threats in the marine environment, including oil and gas exploration, development, and transportation; marine pollution; trawl, purse seine, hook and line, gill net, pound net, longline, and trap fisheries; underwater explosions; dredging, offshore artificial lighting; power plant entrapment; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching. On their nesting beaches in the U.S., loggerhead sea turtles are threatened with beach erosion, armoring, and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; exotic dune and beach vegetation; predation by exotic species such as fire ants, raccoons (*Procyon lotor*), armadillos (*Dasypus novemcinctus*), opossums (*Didelphus virginiana*); and poaching.

Large numbers of loggerhead sea turtles from the four subpopulations that occur in the action area are captured, injured, or killed in a wide variety of fisheries. Virtually all of the pelagic immature loggerheads taken in the Portuguese longline fleet in the vicinity of the Azores and Madiera are from western North Atlantic nesting subpopulations (Bolten *et al.* 1994, 1998) and about half of those taken in both the eastern and western basins of the Mediterranean Sea are from the western North Atlantic subpopulations (Bowen *et al.* 1993; Laurent *et al.* 1998). Aguilar *et al.* (1995) estimated that the Spanish swordfish longline fleet, which is only one of the many fleets operating in the region, alone captures more than 20,000 juvenile loggerheads annually (killing as many as 10,700). Estimated bycatch of marine turtles by the U.S. Atlantic tuna and swordfish longline fisheries, based on observer data, was significantly greater than reported in logbooks through 1997 (Johnson *et al.* 1999; Witzell 1999), but was comparable by 1998 (Yeung, 1999). Observer records indicate that an estimated 6,544 loggerheads were captured by the U.S. fleet between 1992-1998, of which an estimated 43 were dead (Yeung *et al.* in prep.). For 1998 an estimated 510 loggerheads (225-1250) were captured and, based on serious injury criteria developed for marine mammals (which may be inappropriate for sea turtles), all were presumed dead or were expected to die subsequent to being captured. Logbooks and observer records indicated that loggerheads readily ingest hooks (Witzell 1999). Aguilar *et al.* (1995) reported that hooks were removed from only 171 of 1,098 loggerheads captured in the Spanish longline fishery, describing that removal was possible only when the hook was found in the mouth, the tongue or, in a few cases, externally (flippers, *etc.*); the presumption is that all others had ingested the hook.

Loggerhead sea turtles also face numerous threats from natural causes. For example, there is a significant overlap between hurricane seasons in the Caribbean Sea and northwest Atlantic Ocean (June to November) and loggerhead sea turtle nesting season (March to November); hurricanes can have potentially disastrous effects on the survival of eggs in sea turtle nests. In 1992, Hurricane Andrew affected turtle nests over a 90-mile length of coastal Florida; all of the eggs were destroyed by storm surges on beaches that were closest to the eye of this hurricane (Milton *et al*. 1992). On Fisher Island near Miami, Florida, 69 percent of the eggs did not hatch after Hurricane Andrew, probably because they were drowned by the storm surge. Nests from the northern subpopulation were destroyed by hurricanes which made landfall in North Carolina in the mid to late 1990s. Sand accretion and rainfall that result from these storms can appreciably reduce hatchling success. These natural phenomena probably have significant, adverse effects on the size of specific year classes; particularly given the increasing frequency and intensity of hurricanes in the Caribbean Sea and northwest Atlantic Ocean.

Status and trend of loggerhead sea turtles

Several published reports have presented the problems facing long-lived species that delay sexual maturity in a world replete with threats from a modern, human population (Congdon et al. 1993, Congdon and Dunham 1994, Crouse *et al.* 1987, Crowder *et al.* 1994, Crouse 1999). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high, annual survival as juveniles through adults to ensure that enough juvenile sea turtles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes. This general rule applies to sea turtles, particularly loggerhead sea turtles, because the rule originated in studies of sea turtles

(Crouse *et al.* 1987, Crowder *et al.* 1994, Crouse 1999). Heppell *et al.* (in prep.) specifically showed that the growth of the loggerhead sea turtle population was particularly sensitive to changes in the annual survival of both juvenile and adult sea turtles and that the adverse effects of the pelagic longline fishery on loggerheads from the pelagic immature phase appeared critical to the survival and recovery of the species. Crouse (1999) concluded that relatively small changes in annual survival rates of both juvenile and adult loggerhead sea turtles will adversely affect large segments of the total loggerhead sea turtle population.

The four major subpopulations of loggerhead sea turtles in the northwest Atlantic — northern, south Florida, Florida panhandle, and Yucatán — are all subject to fluctuations in the number of young produced annually because of natural phenomena like hurricanes as well as human-related activities. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merrit Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection and probably cause fluctuations in sea turtle nesting success. Volusia County, Florida, for example, allows motor vehicles to drive on sea turtle nesting beaches (the County has filed suit against the FWS to retain this right) and sea turtle nesting in Indian River, Martin, West Palm, and Broward counties of Florida can be affected by beach armoring, beach renourishment, beach cleaning, artificial lighting, predation, and poaching.

As discussed previously, the survival of juvenile loggerhead sea turtles is threatened by a completely different set of threats from human activity once they migrate to the ocean. Pelagic immature loggerhead sea turtles from these four subpopulations circumnavigate the North Atlantic over several years (Carr 1987, Bjorndal 1994). During that period, they are exposed to a series of long-line fisheries that include an Azorean long-line fleet, a Spanish long-line fleet, and various fleets in the Mediterranean Sea (Aguilar *et al*. 1995, Bolten *et al.* 1994, Crouse 1999). Based on their proportional distribution, the capture of immature loggerhead sea turtles in long-line fleets in the Azores and Madiera Archipelagoes and the Mediterranean Sea will have a significant, adverse effect on the annual survival rates of juvenile loggerhead sea turtles from the western Atlantic subpopulations, with a disproportionately large effect on the northern subpopulation that may be significant at the population level.

In waters off coastal U.S., the survival of juvenile loggerhead sea turtles is threatened by a suite of fisheries in Federal and State waters. Loggerhead turtles are captured, injured, or killed in shrimp fisheries off the Atlantic coast; along the southeastern Atlantic coast, loggerhead turtle populations are declining where shrimp fishing is intense off the nesting beaches (NRC 1990). Conversely these nesting populations do not appear to be declining where nearshore shrimping effort is low or absent. The management of shrimp harvest in the Gulf of Mexico demonstrates the correlation between shrimp trawling and impacts to sea turtles. Waters out to 200nm are closed to shrimp fishing off of Texas each year for approximately a 3 month period (mid May through mid July) to allow shrimp to migrate out of estuarine waters; sea turtle strandings decline dramatically during this period (NMFS, STSSN unpublished data). Loggerhead sea turtles are captured in fixed pound-net gear in the Long Island Sound, in pound-net gear and trawls in summer flounder and other finfish fisheries in the mid-Atlantic and Chesapeake Bay, in gill net fisheries in the mid-Atlantic and elsewhere, in fisheries for monkfish and for spiny dogfish, and in northeast sink gillnet fisheries (see further discussion in the *Environmental Baseline* of this Opinion). Witzell (1999) compiled data on capture rates of loggerhead and leatherback turtles in U.S. longline fisheries in the Caribbean and northwest Atlantic; the cumulative takes of these fisheries approach those of the U.S. shrimp fishing fleet (Crouse 1999, NRC 1990).

Leatherback turtle (*Dermochelys coriacea*)

The Recovery Plan for Leatherback Turtles (*Dermochelys coriacea*) contains a description of the natural history and taxonomy of this species (FWS and NMFS 1992). Leatherbacks are widely distributed throughout the oceans of the world, and are found throughout waters of the Atlantic, Pacific, Caribbean, and the GOM (Ernst and Barbour 1972). They are predominantly distributed pelagically, feeding primarily on jellyfish such as *Stomolophus, Chryaora,* and *Aurelia* (Rebel 1974). Leatherbacks are deep divers, with recorded dives to depths in excess of 1000 m (Eckert *et al.* 1998), but they may come into shallow waters if there is an abundance of jellyfish nearshore. Leary (1957) reported a large group of up to 100 leatherbacks just offshore of Port Aransas, Texas associated with a dense aggregation of *Stomolophus*. They also occur annually in places such as Cape Cod and Narragansett bays during certain times of the year, particularly the fall.

The leatherback is the largest living turtle and it ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS 1995). Leatherback turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas) and are often found in association with jellyfish. TDR data recorded by Eckert *et al.* (1998) indicate that leatherbacks are night feeders. Of the turtle species common to the action area, leatherback turtles seem to be the most susceptible to entanglement in lobster gear and, along with loggerheads, to longline gear. This susceptibility may be the result of attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, and perhaps to the lightsticks used to attract target species in the longline fishery.

Although leatherbacks are a long lived species (> 30 years), they are somewhat faster to mature than loggerheads, with an estimated age at sexual maturity reported as about13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996).

Compared to the current knowledge regarding loggerhead populations, the genetic distinctness of leatherback populations is less clear. However, genetic analyses of leatherbacks to date indicate that within the Atlantic basin significant genetic differences occur between St. Croix, U.S. V.I. and mainland Caribbean populations (Florida, Costa Rica, Suriname and French Guiana) and between Trinidad and the same mainland populations (Dutton *et al*. 1999), leading to the conclusion that there are at least 3 separate subpopulations of leatherbacks in the Atlantic. Much of the genetic diversity is contained in the relatively small insular subpopulations. To date, no studies have been published on pelagic or benthic foraging leatherbacks in the Atlantic and thus is it not known what populations are being impacted by the pelagic longline fishery (or other HMS fisheries, for that matter).

Although populations or subpopulations of leatherback sea turtles have not been formally recognized, based on the most recent reviews of the analysis of population trends of leatherback sea turtles, and due to our limited understanding of the genetic structure of the entire species, the most conservative approach would be to treat leatherback nesting populations as distinct populations whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood for one or more of these nesting populations to survive and recover in the wild, would appreciably reduce the species' likelihood of survival and recovery in the wild.

Nest counts are currently the only reliable indicator of population status available for leatherback turtles. Recent declines have been seen in the number of leatherbacks nesting worldwide (NMFS and USFWS 1995). The status of the leatherback population in the Atlantic is difficult to assess since major nesting beaches occur over broad areas within tropical waters outside the United States. The nesting population within US jurisdiction is presumed to be stable. Numbers at some nesting beaches (e.g. St. Croix, Florida, Puerto Rico, are increasing; P. Dutton, pers. comm.), although some nesting beaches in the U.S. Virgin Islands have been extirpated including nesting assemblages in other areas of the Caribbean such as St. John and St. Thomas. The nesting beach at Sandy Point, St. Croix, which has witnessed an increase in the population, has been subject to intensive conservation management efforts since 1981. However, it is not known whether the observed increase is due to improved adult survival or recruitment of new nesters, since flipper tag loss is so high in this species. Better data collection methods implemented since the late 1980s may soon help to answer these questions. Based on an expected inter-nesting interval of one to five years, Dutton *et al*. (in press) estimate a 19 - 49% mortality rate for re-migrating females at Sandy Point. Researchers are currently unable to explain the underlying mechanisms which somehow are resulting simultaneously in such high mortality levels to nesting age females, and yet exponential growth in the nesting population.

In the western Atlantic, the primary nesting beaches occur in French Guiana, Suriname, and Costa Rica.

The nesting population of leatherback sea turtles in the Suriname-French Guiana trans-boundary region has been declining since 1992 (Chevalier and Girondot, (1998). The current status of nesting populations in French Guiana and Suriname is difficult to interpret because these beaches are so dynamic geologically. Chevalier (pers. comm.) in a talk at the recent Annual Sea Turtle Symposium on March 2, 2000, entitled "Driftnet Fishing in the Marconi Estuary: the Major Reason for the Leatherback Turtle's Decline in the Guianas," stated that since the middle 1970's leatherback nesting has declined (1987-1992 mean = 40,950 nests and 1993-1998 mean = 18,100 nests). He states that there is very little shifting in nesting from French Guiana and Suriname to other Caribbean sites (there has only been 1 tag recapture elsewhere).

The nesting population of leatherback sea turtles in Suriname is also decreasing. Chevalier claims that there is no human-induced mortality on the beach in French Guiana, and natural mortality of adults should be low. There has been very low hatchling success on beaches used for the last 25 years. Chevalier believes that threats to the population include fishing (longlines, drift nets, and trawling), pollution (plastic bags and chemicals), and boat propellers. Around 90% of the nests are laid within 25 km from the Marconi estuary. Strandings in 1997, 98, and 99 in the estuary were 70, 60, and 100, which Chevalier considers underestimates. He questioned the fishermen and actually observed a 1 km (gill) net with 7 dead leatherbacks. This observation, coupled with the strandings, led him to conclude that there were large numbers captured incidentally in large mesh nets. There are protected areas nearshore in French Guiana; offshore, driftnets are set. There are no such protected areas off Suriname, and fishing occurs at the beach. Offshore nets soak overnight in Suriname; many boats fish overnight. According to Chevalier, the French Guiana government is starting up a working group to deal with accidental capture and to enforce the legislation. They will work towards the management of the fishery activity and collaborate with Suriname. They plan to study the accidental capture by the fishermen, satellite track turtles, and study strandings. The main problem appears to be the close proximity of the driftnet fishery to the nesting areas.

Swinkels (pers. comm.) also gave a presentation at the symposium on March 3, 2000 entitled "The Leatherback on the Move? Promising News from Suriname." Swinkels stated that from 1995- 1999 there was a large increase in leatherback nesting in Suriname. There is a nature reserve in two parts: one in Suriname and one in adjacent French Guiana. There were increasing trends observed on 3 beaches but poaching was 80%. Samsambo is a very dynamic beach, which has been newly created (by natural events) and now is a nesting beach. In 1999 there were >4000 nests of which about 50% were poached. In 1995 very few were poached (very little poaching effort was then concentrated there because at the time there wasn't much beach or nesting). Swinkels indicated that since that time, however, poaching has been increasing. The beach has naturally been renourished over this period. Swinkels' null hypothesis was that there had been a shift in nesting activity (from other nesting areas). His alternate hypothesis was that the new nesting represented new recruitment to the population.

The status of leatherbacks in the Pacific appears more dire than the Atlantic. The East Pacific leatherback population was estimated to be over 91,000 adults in 1980 (Spotila 1996). Declines in nest abundance have been reported from primary nesting beaches. At Mexiquillo, Michoacan, Mexico, Sarti *et al.* (1996) reported an average annual decline in nesting of about 23% between 1984 and 1996. The total number of females nesting on the Pacific coast of Mexico during the 1995-1996 season was estimated at fewer than 1,000. Less than 700 females are estimated for Central America (Spotila 2000). In the western Pacific, the decline is equally severe. Current nestings at Terengganu, Malaysia represent 1% of the levels recorded in the 1950s (Chan and Liew 1996).

Globally, leatherback populations have been decimated worldwide. The population was estimated to number approximately 115,000 adult females in 1980 (Pritchard 1982) and only 34,500 by 1995 (Spotila *et al*. 1996). The decline can be attributed to many factors including fisheries as well as intense exploitation of the eggs (Ross, 1979). On some beaches nearly 100% of the eggs laid have been harvested (Eckert, 1996). Eckert (1996) and Spotila *et al.* (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. The Pacific population appears to be in a critical state of decline, now estimated to number less than 3,000 total adult and subadult animals (Spotila 2000). The status of the Atlantic population is less clear. In 1996, it was reported to be stable, at best (Spotila 1996), but numbers in the Western Atlantic at that writing were reported to be on the order of 18,800 nesting females. According to Spotila (pers.comm.), the

Western Atlantic population currently numbers about 15,000 nesting females, whereas current estimates for the Caribbean (4,000) and the Eastern Atlantic (*i.e.* off Africa, numbering ~ 4,700) have remained consistent with numbers reported by Spotila *et al.* in 1996. Between 1989 and 1995, marked leatherback returns to the nesting beach at St. Croix averaged only 48.5%, but that the overall nesting population grew (McDonald, *et. al*, 1993). This is in contrast to a Pacific nesting beach at Playa Grande, Costa Rica, where only 11.9% of turtles tagged in 1993-94 and 19.0% of turtles tagged in 1994-95 returned to nest over the next five years. Characterizations of this population suggest that is has a very low likelihood of survival and recovery in the wild under current conditions.

Spotila (2000) states that a conservative estimate of annual leatherback fishery-related mortality (from longlines, trawls and gillnets) in the Pacific during the 1990s is 1,500 animals. He estimates that this represented about a 23% mortality rate (or 33% if most mortality was focused on the East Pacific population). Spotila (2000) asserts that most of the mortality associated with the Playa Grande nesting site was fishery related. As noted above, leatherbacks normally live at least 30 years, usually maturing at about 12-13 years. Such long-lived species can not withstand such high rates of anthropogenic mortality.

Spotila *et al.* (1996) describe a hypothetical life table model based on estimated ages of sexual maturity at both ends of the species' natural range (5 and 15 years). The model concluded that leatherbacks maturing in 5 years would exhibit much greater population fluctuations in response to external factors than would turtles that mature in 15 years. Furthermore, the simulations indicated that leatherbacks could maintain a stable population only if both juvenile and adult survivorship remained high, and that if other life history stages (*i.e.* egg, hatchling, and juvenile) remained static, "stable leatherback populations could not withstand an increase in adult mortality above natural background levels without decreasing...Even the Atlantic populations are being exploited at a rate that cannot be sustained." Model simulations indicated that an increase in adult mortality of more than 1% above background levels in a stable population was unsustainable. Spotila *et al.* (1996) recommended not only reducing mortalities resulting from fishery interaction, but also advocated protection of eggs during the incubation period and of hatchlings during their first day, and indicated that such practices could potentially double the chance for survival and help counteract population effects resulting from adult mortality. They conclude "the Atlantic population is the most robust, but it is being exploited at a rate that cannot be sustained and if this rate of mortality continues, these populations will also decline. Leatherbacks are on the road to extinction."

Zug and Parham (1996) point out that the combination of the loss of long-lived adults in fishery related mortality, and the lack of recruitment stemming from elimination of annual influxes of hatchlings because of intense egg harvesting has caused the sharp decline in leatherback populations. The authors state that "the relatively short maturation time of leatherbacks offers some hope for their survival if we can greatly reduce the harvest of their eggs and the accidental and intentional capture and killing of large juveniles and adults."

Summary

The conflicting information regarding the status of Atlantic leatherbacks makes it difficult to conclude whether or not the population is currently in decline. Numbers at some nesting sites are up, while at others it is down. At one site (St. Croix), population growth has been documented despite large apparent mortality of nesting females; where data are available, population numbers are down in the Western Atlantic, but stable in the Caribbean and Eastern Atlantic. It does appear, however, that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females.

In the absence of any other population models, the population cannot withstand more than a 1% human-related mortality level which translates to 150 nesting females (Spotila *et al.* 1996; Spotila pers. comm.). As noted above, there are many human-related sources of mortality to leatherbacks; a tally of all leatherback takes anticipated annually under current biological opinions yields a potential for up to 801 leatherback takes, although this sum includes many takes expected to be nonlethal. In 1999 there were 19 animals observed taken dead, or by hook or ingestion, in the longline fishery. Scientific extrapolation of these data has not yet been completed so an accurate estimation of how many animals this represents across the entire fishery is currently unavailable. However, the observed sets represent approximately 3% of total effort for 1999; therefore a direct scaling to total effort would estimate that approximately 633 leatherbacks may have been taken dead or seriously injured by the fishery. A direct scaling to 100% effort is inappropriate, as take rates vary widely across different geographical areas of the fishery (as well as seasonally and inter-annually), but it may at least provide an idea of the potential order of magnitude of dead or seriously injured animals associated with this fishery. Perhaps a better way of looking at the data is to apply the 29% mortality estimate provided by Aguilar (1995) to the average annual estimated take of 715 animals (Yeung *et al.* in prep.), which indicates that an average of 207 animals annually either die or are seriously injured by pelagic longlines in the U.S. fleet.

Based on the information outlined above, the pelagic longline fishery alone may be killing leatherback sea turtles at levels equal to or greater than the 1% maximum sustainable level of total human-related mortality supported by the work of Spotila *et al*. (1996). When other pressures on leatherback sea turtle populations, including the number of leatherbacks that are injured or killed in other fisheries and other federal activities (*e.g*. military activities, oil and gas development, *etc*.), the continued harvest of eggs and adults turtles for meat in some Caribbean and Latin nations, the effects of ocean pollution, natural disturbances such as hurricanes (which may wipe out nesting beaches), the total number of turtles that die in any given year reduces the leatherback turtles reproduction, numbers, or distribution in a way that would be expected to appreciably reduce their likelihood of survival and recovery in the wild.

Green turtle (*Chelonia mydas*)

Green turtles are distributed circumglobally, mainly in waters between the northern and southern 20^{o} C isotherms (Hirth 1971). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and fisheries in the United States and throughout the Caribbean are largely to blame for the decline of the species.

In the western Atlantic, several major nesting assemblages have been identified and studied (Peters 1954, Carr and Ogren 1960, Parsons 1962, Pritchard 1969, Carr *et al.* 1978). In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Occasional nesting has been documented along the Gulf coast of Florida, at Southwest Florida beaches, as well as the beaches on the Florida Panhandle (Meylan *et al.* 1995). Most documented green turtle nesting activity occurs on Florida index beaches, which were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan *et al.* 1995).

While nesting activity is obviously important in identifying population trends and distribution, the majority portion of a green turtle's life is spent on the foraging grounds. Green turtles are herbivores, and appear to prefer marine grasses and algae in shallow bays, lagoons and reefs (Rebel 1974). Some of the principal feeding pastures in the Gulf of Mexico include inshore south Texas waters, the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. Additional important foraging areas in the western Atlantic include the Indian River Lagoon System in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito coast of Nicaragua, the Caribbean coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). The preferred food sources in these areas are *Cymodocea, Thalassia, Zostera, Sagittaria,* and *Vallisneria* (Babcock 1937, Underwood 1951, Carr 1952, 1954).

Green turtles were once abundant enough in the shallow bays and lagoons of the Gulf to support a commercial fishery, which landed over one million pounds of green turtles in 1890 (Doughty 1984). Doughty reported the decline in the turtle fishery throughout the Gulf of Mexico by 1902. Currently, green turtles are uncommon in offshore waters of the northern Gulf, but abundant in some inshore embayments. Shaver (1994) live-captured a number of green turtles in channels entering into Laguna Madre, in South Texas. She noted the abundance of green turtle strandings in Laguna Madre inshore waters and opined that the turtles may establish residency in the inshore foraging habitats as juveniles. Algae along the jetties at entrances to the inshore waters of South Texas was thought to be important to green turtles associated with a radio-telemetry project (Renaud *et al.* 1995). Transmitter-equipped turtles remained near jetties for most of the tracking period. This project was restricted to late summer months, and therefore may reflect seasonal influences. Coyne (1994) observed increased movements of green turtles during warm water months.

Hawksbill turtle (*Eretmochelys imbricata*)

The hawksbill turtle is relatively uncommon in the waters of the continental United States, preferring coral reefs, such as those found in the Caribbean and Central America. Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands. NMFS has designated the coastal waters surrounding Mona and Monito Islands, off the west coast of Puerto Rico, as critical habitat for hawksbills. Mona Island supports the largest population of nesting hawksbills in the U.S. Caribbean. In the northern Gulf of Mexico, a surprising number of small hawksbills are encountered in Texas. Most of the Texas records are probably in the 1-2 year class range. Many of the individuals captured or stranded are unhealthy or injured (Hildebrand 1983). The lack of sponge-covered reefs and the cold winters in the northern Gulf of Mexico probably prevent hawksbills from establishing a strong presence in that area. Of the 65 geopolitical units worldwide, where estimates of relative hawksbill nesting density exists, 38 of them have hawksbill populations that are suspected or known to be in decline and an additional 18 have experienced "well-substantiated declines" (NMFS and USFWS 1995).

Kemp's ridley turtle (*Lepidochelys kempi*)

Of the seven extant species of sea turtles of the world, the Kemp's ridley has declined to the lowest population level. The Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempi*) (FWS and NMFS 1992b) contains a description of the natural history, taxonomy, and distribution of the Kemp's ridley turtle. Kemp's ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico. Most of the population of adult females nest in this single locality (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the early 1970s, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The population declined further through the mid-1980s. Recent observations of increased nesting suggest that the decline in the ridley population has stopped and there is cautious optimism that the population is now increasing.

The nearshore waters of the Gulf of Mexico are believed to provide important developmental habitat for juvenile Kemp's ridley and loggerhead sea turtles. Ogren (1988) suggests that the Gulf coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. Stomach contents of Kemp's ridleys along the lower Texas coast consisted of a predominance of nearshore crabs and mollusks, as well as fish, shrimp and other foods considered to be shrimp fishery discards (Shaver 1991). Analyses of stomach contents from sea turtles stranded on upper Texas beaches apparently suggest similar nearshore foraging behavior (Plotkin pers. comm.).

Research being conducted by Texas A&M University has resulted in the intentional live-capture of hundreds of Kemp's ridleys at Sabine Pass and the entrance to Galveston Bay. Between 1989 and

1993, 50 of the Kemp's ridleys captured were tracked (using satellite and radio telemetry) by biologists with the NMFS Galveston Laboratory. The tracking study was designed to characterize sea turtle habitat and to identify small and large scale migration patterns. Preliminary analysis of the data collected during these studies suggests that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud, NMFS Galveston Laboratory, pers. comm.).

In recent years, unprecedented numbers of Kemp's ridley carcasses have been reported from Texas and Louisiana beaches during periods of high levels of shrimping effort. NMFS established a team of population biologists, sea turtle scientists, and managers, known as the Turtle Expert Working Group (TEWG) to conduct a status assessment of sea turtle populations. Analyses conducted by the group have indicated that the Kemp's ridley population is in the early stages of recovery; however, strandings in some years have increased at rates higher than the rate of increase in the Kemp's population (TEWG 1998). While many of the stranded turtles observed in recent years in Texas and Louisiana are believed to have been incidentally taken in the shrimp fishery, other sources of mortality exist in these waters. These stranding events illustrate the vulnerability of Kemp's ridley and loggerhead turtles to the impacts of human activities in nearshore Gulf of Mexico waters.

The TEWG (1998) developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by the TEWG. Model results identified three trends in benthic immature Kemp's ridleys. Benthic immatures are those turtles that are not yet reproductively mature but have recruited to feed in the nearshore benthic environment, where they are available to nearshore mortality sources that often result in strandings. Benthic immature ridleys are estimated to be 2-9 years of age and 20-60 cm in length. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the U.S. Fish and Wildlife Service (FWS) and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990 due, in part, to the introduction of turtle excluder devices (TEDs). Adult ridley numbers have now grown from a low of approximately 1,050 adults producing 702 nests in 1985, to greater than 3,000 adults producing 1,940 nests in 1995 and about 3,400 nests in 1999.

The TEWG (1998) was unable to estimate the total population size and current mortality rates for the Kemp's ridley population. However, the TEWG listed a number of preliminary conclusions. The TEWG indicated that the Kemp's ridley population appears to be in the early stage of exponential expansion. Over the period 1987 to 1995, the rate of increase in the annual number of nests accelerated in a trend that would continue with enhanced hatchling production and the use of TEDs. Nesting data indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and a low of 702 nests in 1985. This the trajectory of adult abundance tracks trends in nest abundance from an estimate of 9,600 in 1966 to

1,050 in 1985. The TEWG estimated that in 1995 there were 3,000 adult ridleys. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6% to 28% from 1981 to 1989 and from 23% to 41% from 1990 to 1994. The population model in the TEWG projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates plugged into their model are correct. It determined that the data reviewed suggested that adult Kemp's ridley turtles were restricted somewhat to the Gulf of Mexico in shallow near shore waters, and benthic immature turtles of 20-60 cm straight line carapace length are found in nearshore coastal waters including estuaries of the Gulf of Mexico and the Atlantic.

The TEWG (1998) identified an average Kemp's ridley population growth rate of 13% per year between 1991 and 1995. Total nest numbers have continued to increase. However, the 1996 and 1997 nest numbers reflected a slower rate of growth, while the increase in the 1998 nesting level has been much higher and decreased in 1999. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular internesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable.

The area surveyed for ridley nests in Mexico was expanded in 1990 due to destruction of the primary nesting beach by Hurricane Gilbert. The TEWG (1998) assumed that the increased nesting observed particularly since 1990 was a true increase, rather than the result of expanded beach coverage. Because systematic surveys of the adjacent beaches were not conducted prior to 1990, there is no way to determine what proportion of the nesting increase documented since that time is due to the increased survey effort rather than an expanding ridley nesting range. As noted by TEWG, trends in Kemp's ridley nesting even on the Rancho Nuevo beaches alone suggest that recovery of this population has begun but continued caution is necessary to ensure recovery and to meet the goals identified in the Kemp's Ridley Recovery Plan.

Critical Habitat (Northern Right Whale)

The nearshore waters of northeast Florida and southern Georgia were formally designated as critical habitat for right whales on June 3, 1994 (59 FR, 28793). These waters were first identified as a likely calving and nursery area for right whales in 1984. Since that time, Kraus *et al*. (1993) have documented the occurrence of 74 percent of all the known mature females from the North Atlantic population in this area. While sightings off Georgia and Florida include primarily adult females and calves, juveniles and adult males have also been observed.

There are five well-known habitats used annually by right whales, including 1) coastal Florida and Georgia, 2) the Great South Channel, east of Cape Cod, 3) Cape Cod and Massachusetts bays, 4) the Bay of Fundy and, 5) Browns and Baccaro Banks, south of Nova Scotia. The first three areas occur in U.S. waters and have been designated by NMFS as critical habitat (59 FR, 28793). With the exception of the southeast U.S. shark gillnet fishery (which is now prohibited by regulation from operating within the southeastern critical habitat area during the season when right whales are in the area), HMS fisheries do not generally co-occur in time and space with these critical habitat areas. However, as discussed in the section below describing marine mammal take reduction plans impacting the environmental baseline upon which this biological opinion is based, the draft take reduction plan submitted to NMFS by the Atlantic Offshore Take Reduction Team recommends that NMFS implement regulations prohibiting pelagic longline gear from being deployed in right whale critical habitat areas (in order to ensure future expansion of the fishery into new areas). Although the current lack of such fisheries in these areas is due to their lack of concentrations of target HMS fish species, NMFS should strive to implement this recommendation in the near future to ensure against potential changes to the current situation.

IV. Environmental Baseline

This section contains an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, their habitat (including designated critical habitat), and ecosystem, within the action area. The environmental baseline is a snapshot of a species' health at a specified point in time and includes state, tribal, local and private actions already affecting the species, or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat.

The environmental baseline for this Biological Opinion includes the effects of several activities that affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation generally fall into the following three categories: vessel operations, fisheries, and recovery activities associated with reducing those impacts. Other environmental impacts include effects of discharges, dredging, ocean dumping, sonic activity, and aquaculture.

Status of the Species within the Action Area

The listed species occurring in the action area are all highly migratory, and the scope of the action area includes all pelagic areas within which these species may be found within the U.S. EEZ. Therefore, the range-wide status of the species given in Section II above most appropriately reflects the species' status within the action area.

(a) Factors Affecting Species within the Action Area

In recent years, NMFS has undertaken several ESA section 7 consultations to address the effects of vessel operations and gear associated with Federally-permitted fisheries on threatened and endangered species in the action area. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on large whales and sea turtles. Similarly, recovery actions NMFS has undertaken under both the MMPA and the ESA are addressing the problem of take of whales in the fishing and shipping industries. Incidental take levels anticipated under the incidental take statements associated with these existing biological opinions are summarized in Table 1. below, followed by a brief discussion of each action consulted on. The following summary of anticipated incidental take of turtles includes only those federal actions which have undergone formal section 7 consultation.

(1) *Vessel Operations*. Potential adverse effects from Federal vessel operations in the action area of this consultation include operations of the USN and USCG, which maintain the largest Federal vessel fleets, the Environmental Protection Agency, the National Oceanic and Atmospheric Administration (NOAA), and the ACOE. NMFS has conducted formal consultations with the USCG, the USN (described below) and is currently in early phases of consultation with the other Federal agencies on their vessel operations. In addition to operation of ACOE vessels, NMFS has consulted with the ACOE to provide recommended permit restrictions for operations of contract or private vessels around whales. Through the section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. At the present time, however, they represent potential for some level of interaction. Refer to the Biological Opinions for the USCG (NMFS 1995, 1996b, and 1998) and the USN (NMFS 1997a) for detail on the scope of vessel operations for these agencies and conservation measures being implemented as standard operating procedures.

Table 1. Summary of annual incidental take levels anticipated under the incidental take statements associated with NMFS' existing biological opinions in the US Atlantic and Gulf of Mexico.

Federal Action	Annual Anticipated Incidental Take Level (lethal or non)				
	Loggerhead	Leatherback	Green	Kemp's	Hawksbill
Coast Guard Vessel Operation	1[1]	1[1]	1[1]	1[1]	1[1]
Navy – SE Ops Area	84	12	12[1]	12[1]	0
Shipshock – Seawolf	50	6	4[1]	4[1]	4[1]
COE Dredging – S. Atlantic	35	0	7	7	2
COE Dredging - N & W Gulf of Mexico	30	0	8	14	2
COE Dredging - E Gulf of Mexico	2 + 8[2]	0 + 5[2]	1 + 5[2]	1 + 5[2]	1 + 5[2]
COE Rig Removal, Gulf of Mexico	1[1]	1[1]	1[1]	1[1]	1[1]
MMS Rig Removal, Gulf of Mexico	10[3]	5[3]	5[3]	5[3]	5[3]
NE Multispecies Sink Gillnet Fishery	100[4]	10[4]	10[4]	10[4]	10[4]
ASMFC Lobster Plan	0[5]	0[5]	0[5]	0[5]	0[5]
Monkfish Fishery[7]	6	1	1	1	0
Dogfish Fishery	6	1	1	1	0
Summer Flounder, Scup & Black Sea Bass	15	3[1]	3[1]	3[1]	3[1]
Shrimp Fishery	3550[1]	650	3550[1]	3550[1]	3550[1]
NRC – St. Lucie, FL	5	1	10	1	1

NRC – Brunswick, NC	50[1] (6)	50[1] (0)	50[1] (3)	50[1] (2)	50[1] (0)
NRC – Crystal River, FL	55[1] (1)	55[1] (1)	55[1] (1)	55[1] (1)	55[1] (1)
Total (maximum anticipated[6])	**4008**	**801**	**3724**	**3721**	**3690**

[1]Up to this amount for these species, in combination. In most cases, it is expected that takes of turtle species other than loggerheads will be minimal. Parentheses indicate expected mortalities, where provided in the BO. Other numbers represent "takes", including non-lethal captures.
[2]Up to 8 turtles total, of which, no more than 5 may be leatherbacks, greens, Kemp's or hawksbill, in combination.
[3]Not to exceed 25 turtles, in total.
[4]As part of the 1989 biological opinion on the Issuance of Exemptions for Commercial Fishing Operations under MMPA Section 114.
[5]Included in totals noted above.
[6]Maximum values given for non-loggerhead hardshell turtles are extreme, due to lumping of anticipated takes across species under ITSs.
[7]Due to the implication of this fishery's involvement in the recent NC strandings, this consultation must be reinitiated and will likely result in higher anticipated take levels.

Since the USN consultation only covered operations out of Mayport, Florida, potential still remains for USN vessels to adversely affect large whales and sea turtles when they are operating in other areas within the range of these species. Similarly, operations of vessels by other Federal agencies within the action area (NOAA, EPA, ACOE) may adversely affect whales and sea turtles. However, the in-water activities of those agencies are limited in scope, as they operate a limited number of vessels or are engaged in research/operational activities that are unlikely to contribute a large amount of risk.

(2) *Additional military activities*, including vessel operations and ordnance detonation, also affect listed species of whales and sea turtles. USN aerial bombing training in the ocean off the southeast U.S. coast, involving drops of live ordnance (500 and 1,000-lb bombs) is estimated to have the potential to injure or kill, annually, 84 loggerheads, 12 leatherbacks, and 12 greens or Kemp's ridley, in combination (NMFS, 1997a). The USN will also conduct ship-shock testing for the new SEAWOLF submarine off the Atlantic coast of Florida, using 5 submerged detonations of 10,000 lb explosive charges. This testing is estimated to injure or kill 50 loggerheads, 6 leatherbacks, and 4 hawksbills, greens, or Kemp's ridleys, in combination (NMFS, 1996c). Operation of the USCG's boats and cutters in the U.S. Atlantic, meanwhile, is estimated to take no more than one individual turtle—of any species—per year (NMFS, 1995). Formal consultation on USCG or USN activities in the Gulf of Mexico has not been conducted.

The construction and maintenance of Federal navigation channels has also been identified as a source of turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle. Along the Atlantic coast of the southeastern United States, NMFS estimates that annual, observed injury or mortality of sea turtles from hopper dredging may reach 35 loggerheads, 7 greens, 7 Kemp's ridleys, and 2 hawksbills (NMFS, 1997b). Along the north and west coasts of the Gulf of Mexico, channel maintenance dredging using a hopper dredge may injure or kill 30 loggerhead, 8 green, 14 Kemp's ridley, and 2 hawksbill sea turtles annually (NMFS, 1997c). Additional incidental take statements for dredging of Charlotte Harbor and Tampa Bay, FL anticipate this project may incidentally take, by injury or mortality, of two (2) loggerheads or one (1) Kemp's ridley or one (1) green or one (1) hawksbill sea turtle for Charlotte Harbor and eight (8) sea turtles, including no more than five (5) documented Kemp's ridley, hawksbill, leatherback, or green turtles, in any combination, for Tampa Bay.

US Army Corps of Engineers (COE) and Minerals Management Service (MMS) (the latter is non-military) rig removal activities also adversely affect sea turtles. For the COE activities, an incidental take (by injury or mortality) of one documented Kemp's ridley, green, hawksbill, leatherback, or loggerhead turtle is anticipated under a rig removal consultation for the New Orleans District (NMFS 1998b). MMS activities are anticipated to result in annual incidental take (by injury or mortality) of twenty five sea turtles, including no more than five Kemp's ridley, green, hawksbill, or leatherback turtles and no more than ten loggerhead turtles, due to MMS' OCS oil and gas exploration, development, production, and abandonment activities.

(3) Federal Fishery Operations. Adverse effects on threatened and endangered species from several types of fishing gear occur in the action area. Efforts to reduce the adverse effects of commercial fisheries are addressed through both the MMPA take reduction planning process and the ESA section 7 process. Gillnet, longline, trawl gear, and pot fisheries have all been documented as interacting with either whales or sea turtles or both. Other gear types are known to impact whales as well. For all fisheries for which there is a Federal fishery management plan (FMP) or for which any Federal action is taken to manage that fishery, impacts have been evaluated under section 7.

Several formal consultations have been conducted on the following fisheries that NMFS has determined are likely to adversely affect threatened and endangered species: American Lobster, Monkfish, Dogfish, Northeast Multispecies, Atlantic Pelagic Swordfish/Tuna/Shark, and Summer Flounder/Scup/Black Sea Bass fisheries. These consultations are summarized below; for more detailed information, refer to the respective Biological Opinions.

The *Northeast Multispecies Sink Gillnet Fishery* is one of the other major fisheries in the action area of this consultation that is known to entangle whales and sea turtles. This fishery has historically occurred from the periphery of the Gulf of Maine to Rhode Island in water to 60 fathoms. In recent years, more of the effort in this fishery has occurred in offshore waters and into the Mid-Atlantic. Participation in this fishery declined from 399 to 341 permit holders in 1993 and is expected to continue to decline as further groundfish conservation measures are implemented. The fishery operates throughout the year with peaks in the spring and from October through February. Data indicate that gear used in this fishery has seriously injured right whales, humpback whales, fin whales, and loggerhead and leatherback sea turtles. Waring *et al.* (1997) reports that 17 serious injuries or mortalities of humpback whales from 1991 to 1996 were fishery interactions (not necessarily multispecies gear), the majority of which indicated some kind of monofilament like that used in the multispecies fishery. It is often difficult to assess gear found on stranded animals or observed at sea and assign it to a specific fishery. Only a fraction of the takes are observed, and the catch rate represented by the majority of takes, which are reported opportunistically, *i.e.*, not as part of a random sampling program, is unknown. Consequently, the total level of interaction cannot be determined through extrapolation. The incidental take level established for this fishery is in the July 5, 1989 BO on the Issuing of Exemptions for Commercial Fishing Operations under Section 114 of the MMPA (NMFS, 1989), which estimated that 10 documented Kemp's ridleys, 10 green, 10 hawksbill, 10 leatherback, and 100 loggerhead sea turtles would be killed or injured by the fishery annually.

The *American Lobster pot fishery* is the largest fixed gear fishery in the action area. This fishery is known to take endangered whales and sea turtles. In 1998, NMFS reinitiated formal consultation on the federally regulated lobster fishery to consider potential effects of the transfer of management authority from the Magnuson-Stevens Act to the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA), the implementation of new lobster management actions under the ACFCMA, and recent takes of endangered whales in the fishery. The previous formal consultation on the fishery under the MSFCMA had reached a jeopardy conclusion for the northern right whale with the Biological Opinion issued December 13, 1996. As a result of the RPA included with the 1996 Biological Opinion, an emergency regulation under the MMPA (Emergency Interim Final Rule, 62 FR 16108) was published implementing restrictions on the use of lobster pot gear in the federal portion of the Cape Cod Bay right whale critical habitat and in the Great South Channel right whale critical habitat during periods of expected peak right whale abundance.

The proposed ACFCMA plan contains measures to limit the number of lobster traps that can be deployed during the first two years of the plan, and further trap reduction measures may be chosen as default effort reduction measures during subsequent plan years. The reduction in the number of traps fished is expected to result in a reduction of entanglement risk. The interaction between the lobster trap fishery and endangered whales is addressed in the Atlantic Large Whale Take Reduction Plan (ALWTRP) implemented via an interim final rule November 15, 1997, followed by a final rule issued February 16,1999. The ALWTRP incorporated the RPA issued with the 1996 Biological Opinion and implemented additional restrictions. Because of the greater protection provided by the ALWTRP, NMFS substituted the ALWTRP for the RPA issued with the 1996 Biological Opinion and has concluded that the lobster fishery in the context of the ALWTRP is likely to adversely affect but is not likely to jeopardize the northern right whale. As with the multispecies BO noted above, the level of incidental take anticipated for this fishery is incorporated within the July 5, 1989 BO on the Issuing of Exemptions for Commercial Fishing Operations under Section 114 of the MMPA, as detailed above (NMFS, 1989).

The monkfish and dogfish fisheries are prosecuted with Multispecies-type gear, and therefore have potential to interact with large whales and are also known to interact with sea turtles. After reviewing the best available information on the status of endangered and threatened species under NMFS jurisdiction, the environmental baseline for the action area, the effects of the action, and the cumulative effects, NMFS concluded in a Biological Opinion issued December 21, 1998, that conduct of the monkfish fishery, with modification to reduce impacts of entanglement through the whale and porpoise TRPs, may adversely affect but is not likely to jeopardize the continued existence of endangered and threatened species under NMFS jurisdiction and is not likely to destroy or adversely modify right whale critical habitat.

The *Monkfish Fishery Management Plan* was recently completed by the New England and Mid-Atlantic Fishery Management Councils. This fishery uses several gear types which may entangle protected species, and takes of shortnose sturgeon and sea turtles have been recorded from monkfish trips. The monkfish gillnet sector is included in either the northeast sink gillnet or mid-Atlantic coastal gillnet fisheries and is therefore regulated by the Atlantic Large Whale and Harbor Porpoise Take Reduction Plans. NMFS completed a formal consultation on the Monkfish FMP on December 21, 1998, which concluded that the fishery, with modification under the take reduction plans, is not likely to jeopardize listed species or adversely modify critical habitat. The ITS provided under this BO anticipates up to 6 incidental takes of loggerhead turtles (no more than 3 lethal), 1 lethal or non-lethal take of a green sea turtle, 1 lethal or non-lethal take of a Kemp's ridley, and 1 lethal or non-lethal take of a leatherback. However, the implication of this fishery in the recent pulse of sea turtle strandings in North Carolina noted elsewhere in this Opinion necessitate reinitiation of consultation and likely the current incidental take levels will be revised in a new incidental take statement.

A consultation was recently concluded for *the Spiny Dogfish Fishery*. This fishery is similar to the monkfish fishery, but uses somewhat smaller mesh gear. The recent Biological Opinion prepared for the FMP for this fishery anticipates 6 takes (no more than 3 lethal) of loggerheads, and 1 take (lethal or non-lethal) each for Kemp's ridley, leatherbacks and green sea turtles.

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. While not documented, the gear-types used in this fishery could entangle endangered whales, particularly humpback whales. Significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl (which would include fisheries for other species like scup and black sea bass) by requiring TEDs in nets in the area of greatest bycatch off the North Carolina and southern Virginia coast. NMFS is considering a more geographically inclusive regulation to require TEDs in trawl fisheries that overlap with sea turtle distribution to reduce the impact from this fishery. Developmental work is also ongoing for a TED that will work in the flynets used in the weakfish fishery. These fisheries are subject to the requirements of the ALWTRP for gillnets and lobster pots in the Mid-Atlantic. The anticipated observed annual take rates for turtles in this multispecies fishery is 15 loggerheads and 3 leatherbacks, hawksbills, greens, or Kemp's ridley, in combination annually (NMFS, 1997a).

The *Southeast U.S. Shrimp Fishery* is known to incidentally take high numbers of sea turtles. Shrimp trawlers in the southeastern U.S. are required to use TEDs, which reduce a trawler's capture rate by 97%. Even so, NMFS estimated that 4,100 turtles may be captured annually by shrimp trawling, including 650 leatherbacks that cannot be released through TEDs, 1,700 turtles taken in try nets, and 1,750 turtles that fail to escape through the TED (NMFS, 1998d), including large loggerheads. Henwood and Stuntz (1987) reported that the mortality rate for trawl-caught turtles ranged between 21% and 38%, although Magnuson *et al.* (1990) suggested Henwood and Stuntz's estimates were very conservative and likely an underestimate of the true mortality rate.

On November 15, 1997, NMFS implemented the interim final rule for the *Atlantic Large Whale Take Reduction Plan* and issued the final rule February 16, 1999. This plan is designed to reduce the rate of serious injury and mortality of right, humpback, fin, and minke whales incidental to the Northeast sink gillnet, lobster pot, Southeast shark gillnet, and Mid-Atlantic gillnet fisheries to acceptable removal levels as defined in the MMPA. A section 7 consultation was conducted on this Plan, including the operation of the four fisheries regulated by the Plan, which concluded, with a Biological Opinion on the interim final rule issued on July 15, 1997 (NMFS 1997e) (and with an informal consultation on the final rule concluded February 16, 1999 (NMFS 1999a), which determined that the basis upon which the previous consultation was concluded was unchanged) that the implementation of the ALWTRP and continued operation of these fisheries may adversely affect, but is not likely to jeopardize the continued existence of any listed species of large whales or sea turtles under NMFS jurisdiction. The primary take reduction measures of the plan include closures and modification of fishing gear and practices to reduce the adverse impacts of entanglement. Since no changes were anticipated from the existing operations of these fisheries, no additional incidental take was anticipated or authorized in this Opinion.

(4) Other – Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. At the St. Lucie nuclear power plant at Hutchinson Island, Florida, large numbers of green and loggerhead turtles have been captured in the seawater intake canal in the past several years. Annual capture levels from 1994-1997 have ranged from almost 200 to almost 700 green turtles and from about 150 to over 350 loggerheads. Almost all of the turtles are caught and released alive; NMFS estimates the survival rate at 98.5% or greater (see NMFS 1997e). A biological opinion completed in January 2000 estimates that the operations at the Brunswick Steam Electric Plant in Brunswick, North Carolina, may take 50 sea turtles in any combination annually, that are released alive. NMFS also estimated the total lethal take of turtles at this plant may reach 6 loggerhead, 2 Kemp's ridley or 3 green turtles annually. A biological opinion completed in June 1999 on the operations at the Crystal River Energy Complex in Crystal River, Florida, estimated the level of take of sea turtles in the plant's intake canal may reach 55 sea turtles with an estimated 50 being released alive biennially.

b. State or private actions

(1) *Private and commercial vessels.* Private and commercial vessels operate in the action area of this consultation and also have the potential to interact with whales and sea turtles. For example, shipping traffic in Massachusetts Bay is estimated at 1,200 ship crossings per year with an average of three per day. More than 280 commercial fishing vessels fish on Stellwagen Bank in the Gulf of Maine, and sportfishing contributes more than 20 vessels per day from May to September. Similar traffic may exist in many other areas within the scope of this consultation which overlap with whale high-use areas. The invention and popularization of new technology resulting in high speed catamarans for ferry services and whale watch vessels operating in congested coastal areas contributes to the potential for impacts from privately-operated vessels in the environmental baseline.

In addition to commercial traffic and recreational pursuits, private vessels participate in high speed marine events concentrated in the southeastern United States that are a particular threat to sea turtles, and occasionally to marine mammals as well. The magnitude of these marine events is not currently known. NMFS and the USCG are in early consultation on these events, but a thorough analysis has not been completed. The Sea Turtle Stranding and Salvage Network (STSSN) also reports many records of vessel interaction (propeller injury) with sea turtles off coastal states such as New Jersey and Florida, where there are high levels of vessel traffic.

(2) *State fishery operations*. Very little is known about the level of take in fisheries that operate strictly in state waters. In addition, depending on the fishery in question, many state permit holders also hold Federal licenses; therefore, section 7 consultations on Federal action in those fisheries address some state-water activity. Impacts of state fisheries on endangered whales are addressed as appropriate through the MMPA take reduction development process. For example, the Atlantic Large Whale Take Reduction Team addresses the mid-Atlantic coastal gillnet fishery, which is largely prosecuted in state waters. NMFS is also actively participating in a cooperative effort with ASMFC to standardize and/or implement programs to collect information on level of effort and bycatch in state fisheries. When this information becomes available, it can be used to refine take reduction plan measures in state waters. With regard to whale entanglements, vessel identification is occasionally recovered from gear removed from entangled animals. With this information, it is possible to determine whether the gear was deployed by a Federal or state permit holder and whether the vessel was fishing in Federal or state waters. In 1998, 3 entanglements of humpback whales were documented in state-water fisheries.

In 1998, East Coast states from Maine through North Carolina began implementing regulations pursuant to the Year 1 requirements of *Amendment 3 to the Atlantic States Marine Fisheries Commission's Coastal Fishery Management Plan for American Lobster* (ASMFC 1997). The proposed Federal ACFCMA plan is designed to be complementary to the ASMFC plan, and the two plans are largely similar in structure. Regulations will be geared toward reducing lobster fishing effort by 2005 to reverse the overfished status of the resource. States in the 6 coastal areas must implement regulations according to a compliance schedule established in Amendment 3. Effort reduction measures will be similar to those proposed in the Federal ACFCMA plan. Several states have implemented trap caps for 1998. Further trap limits, which the compliance schedule requires for Area 1 and the Outer Cape Lobster Management Area in 1999, will generate some localized risk reduction for protected species in those areas. If all states elect to implement a significant trap reduction program, the overall entanglement risk would be substantially reduced. As the definition of the fishery in the MMPA includes state water effort, vessels fishing in state waters will be required to comply with MMPA take reduction plan regulations designed to reduce entanglement risk to whales.

Early in 1997, the *Commonwealth of Massachusetts* implemented restrictions on lobster pot gear in the state water portion of the Cape Cod Bay critical habitat during the January 1 - May 15 period to reduce the impact of the fishery on right whales. The regulations were revised prior to the 1998 season. State regulations impact state permit holders who also hold Federal permits, although effects would be similar to those resulting from Federal regulations during the January 1 - May 15 period. Massachusetts has also implemented winter/spring gillnet restrictions similar to those in the ALWTRP and the MSFCMA for the purpose of right whale and/or harbor porpoise conservation. Lobster pots are fished in areas outside of Massachusetts where sea turtles and the depleted stock of bottlenose dolphin are present. Entanglement has been documented for both species.

A Biological Opinion on the *NMFS/ASMFC interjurisdictional FMP for weakfish* was conducted in June 1997. Weakfish are caught in the summer flounder fishery and are also fished with flynets. Analyses of the NMFS' observer data showed 36 incidental captures of sea turtles for trawl and gillnet vessels operating south of Cape May, New Jersey from April 1994 through December 1996. Of those turtles taken, 28 loggerheads were taken in trawls that also caught weakfish, and resulted in two deaths. Most of the sea turtle takes occurred in late fall. In all cases, weakfish landings were second in poundage behind Atlantic croaker and summer flounder (NEFSC, unpub. data).

The North Carolina Observer program documented 33 flynet trips from November through April of 1991 – 1994 and recorded no turtles caught in 218 hours of trawl effort. However, a NMFS observed vessel fished for summer flounder for 27 tows with an otter trawl equipped with a TED and then fished for weakfish and Atlantic croaker with a fly net that was not equipped with a TED. They caught one loggerhead in 27 TED equipped tows and seven loggerheads in nine fly net tows without TEDs. In addition, the same vessel using the fly net in a previous trip took 12 loggerheads in 11 out of 13 observed tows targeting Atlantic croaker. Weakfish landings from these fly net tows were second in poundage (NEFSC, unpub.data).

A slight potential does exist for interaction between this fishery and humpback whales, particularly in the mid-Atlantic, but no documentation of such interactions is available.

Georgia and South Carolina prohibit gillnets for all but the shad fishery. This fishery was observed in South Carolina for one season by the NMFS Southeast Fisheries Science Center (McFee et al. 1996). No takes of protected species were observed. Florida has banned all but very small nets in state waters, as has the state of Texas. Louisiana, Mississippi and Alabama have also placed restrictions on gillnet fisheries within state waters such that very little commercial gillnetting takes place in southeast waters, with the exception of North Carolina. Most pot fisheries in the southeast are prosecuted only in areas not likely to be frequented by whales, but in areas frequented by sea turtles.

Pulses of greatly elevated sea turtle strandings occur with regularity in the Mid-Atlantic area, particularly along North Carolina through southern Virginia in the late fall/early spring, coincident with their migrations. For example, in the last weeks of April through early May, 2000, approximately 300 turtles, mostly loggerheads, stranded north of Oregon Inlet, NC. Gillnets were found with four of the carcasses. These strandings are likely caused by state fisheries as well as federal fisheries, although not any one fishery has been identified as the major cause. Fishing effort data indicate that fisheries targeting monkfish, dogfish, and bluefish were operating in the area of the strandings. Strandings in this area represent at best, 7-13% of the actual nearshore mortality (Epperly *et al.*, 1996). Studies by Bass *et al.* (1998), Norrgard (1995) and Rankin-Baransky (1997) indicate that the percentage of northern loggerheads in this area is highly over-represented in the strandings when compared to the ~ 9% representation from this subpopulation in the overall U.S. sea turtle nesting populations. Specifically, the genetic composition of sea turtles in this area is 25-54% from the northern subpopulation, 46 - 64% from the South Florida sub-population, and 3-16% from the Yucatan subpopulation. The cumulative removal of these turtles on an annual basis would severely impact the recovery of this species.

c. Conservation and recovery actions shaping the environmental baseline

A number of activities are in progress that ameliorate some of the potential threat from the aforementioned activities. Education and outreach are considered one of the primary tools to reduce the threat of impact from private and commercial vessels. The USCG has provided education to mariners on whale protection measures and uses their programs such as radio broadcasts and notice to mariner publications to alert the public to potential whale concentration areas. The USCG is also participating in international activities (discussed below) to decrease the potential for commercial ships to strike a whale. In addition, outreach efforts for fishermen under the ALWTRP are increasing awareness and fostering a conservation ethic among fishermen that is expected in the long run to help reduce overall probability of adverse impacts in the environmental baseline from these commercial fishing activities.

In addition to the ESA measures for Federal actions mentioned in the previous section, numerous recovery activities are being implemented to decrease the level of impacts from private and commercial vessels in the action area. These include the early warning system (EWS), other activities recommended by the Northeast Recovery Plan Implementation Team for the Right and Humpback Whale Recovery Plans (NEIT) and Southeast Recovery Plan Implementation Team for the Right Whale Recovery Plan (SEIT), and NMFS regulations.

(1) The Northeast and Southeast Early Warning Systems. Due to concern over potential collisions between right whales and hopper dredges operating in what is now designated critical habitat for right whales in southeast waters, monitoring requirements placed on the ACOE under a Biological Opinion resulted, in the 1980's, in the first regular aerial survey flights for right whales in waters off the Southeast United States. These surveys evolved over the years and, since late 1993/early 1994, have been officially sponsored by NMFS, the USCG, USN, and ACOE, and became known as the "Early Warning System" or EWS. The surveys were designed as daily reconnaissance flights to detect the presence of whales in and around a number of busy southeast shipping ports, USN vessel and submarine bases, and ACOE dredging sites, in order to alert vessels of the whales' presence and prevent potential whale/vessel collisions. The EWS, with the assistance of the USN and USCG, has evolved a sophisticated communication network which alerts not only dredges and military vessels in the area, but provides broadcasts to mariners via NAVTEX, NOAA Weather Radio, and other means, and even contacts vessels directly via radio when urgently necessary to prevent imminent collision.

Using the SEUS aircraft survey program as a model, efforts were initiated in 1997 to develop a similar program in the Cape Cod Bay (CCB) and the Great South Channel in late winter and early spring. The program is a cooperative effort by NMFS, the USCG, Massachusetts Division of Fisheries, the Massachusetts Environmental Trust, the Center for Coastal Studies, the USN and MASSPORT (the Boston port authority). As a result of recommendations by the ALWTRT, a similar EWS, known as the "Sighting Advisory System," was established in the northeast in late 1996. NMFS has the ability under the ESA to impose emergency regulations which may be used to protect unusual congregations of right whales. Through a fax-on-demand system, fishermen can obtain SAS sighting reports and, in some cases, can make necessary adjustments in fishing practices to decrease the potential for entanglements. The Commonwealth of Massachusetts was a key collaborator in the 1996-1997 SAS effort and expanded the effort during the 1997-1998 season. The USCG has played a key role in this effort all along, providing both air and sea support, and their continued cooperation is expected throughout. The State of Maine and the Canada Department of Fisheries and Oceans have expressed interest in conducting this type of EWS along their coastal waters. It is expected that other potential sources of sightings such as the U.S. Navy may contribute to this effort following NMFS' commitment to support the SAS over the long-term. The NMFS Maine ALWTRP Coordinator is also working with local aquaria to collect whale sightings from fishing vessels in the Gulf of Maine. All this cooperation will increase the chance of success of this program in diverting potential impacts in the environmental baseline.

(2) The Northeast and Southeast Whale Recovery Implementation Teams. In order to address the known impacts to right and humpback whales described in the Recovery Plans, NMFS established the Northeast and Southeast Recovery Plan Implementation Teams (NEIT and SEIT). The Recovery Plans describe steps to reduce human impacts to levels that will allow the two species to recover and rank the various recovery actions in order of importance. The Implementation Teams provide advice to the various Federal and state agencies or private entities on achieving these national goals within their respective regions. The teams both agreed to focus primarily on habitat and vessel related issues and rely on the take reduction plan process under the MMPA for reducing takes in commercial fisheries.

As part of NEIT activities, a Ship Strike Workshop was held in December 1996 to inform the shipping community of their need to participate in efforts to reduce the impacts of commercial vessel traffic on right whales. The workshop summarized current research efforts using new shipboard and moored technologies as deterrents, and a report was given on ship design studies currently being conducted by the New England Aquarium and Massachusetts Institute of Technology. This workshop increased awareness among the shipping community and has further contributed to reducing the threat of ship strikes of right whales. In addition, a Cape Cod Canal Tide Chart that included information on critical habitat areas and the need for close watch during peak right whale activity was distributed widely to professional mariners and ships passing through the canal. A radio warning transmission was transmitted by Canal traffic managers to vessels transiting the Canal during peak Northern right whale activity periods. Follow-up meetings were held with New England Port Authority and pilots to notify commercial ship traffic to keep a close watch during peak right whale movement periods. In response to current needs, the NEIT is reconfiguring its ship strike subcommittee to address these impacts on a more formal basis. In addition to its ship strike prevention activities, the SEIT established a GIS subcommittee and is progressing with work to analyze right whale sightings, vessel traffic information, and pertinent environmental data in order to better understand right whale distribution patterns in southeast waters and ultimately prevent human interactions with these whales.

(3) The Whale Disentanglement Network. The Center for Coastal studies (CCS), under NMFS authorization, has responded to numerous calls to disentangle various whales entrapped in gear since 1984, and has developed considerable expertise in whale disentanglement. NMFS has supported this effort financially since 1995. The ALWTRP identifies whale disentanglement as an important component of the take reduction plan. As a result, NMFS greatly increased funding for this network,

purchasing equipment caches to be located at strategic spots along the Atlantic coastline, supporting training for fishers and biologists, purchasing telemetry equipment, etc. This has resulted in a greatly expanded capacity for disentanglement along the entire Atlantic seaboard, including offshore areas. MOUs developed with the US Coast Guard ensure their participation and assistance in the disentanglement effort. As a result, NMFS believes that many whales which may otherwise have succumbed to complications from entangling gear, are being set free to survive the ordeal.

(4) Reducing Potential for Vessel Related Impacts. As part of recovery actions aimed at reducing vessel related impacts, NMFS published a proposed rule in August 1996 restricting vessel approach to right whales (61 FR 41116) to distances outside of 500 yards in order to minimize human-induced disturbance. The Recovery Plan for the Northern Right Whale identified disturbance as one of the principal human-related factors impeding right whale recovery (NMFS 1991b). Following public comment, NMFS published an interim final rule in February 1997 codifying the regulations. With certain exceptions, the rules prohibit both boats and aircraft from approaching any right whale closer than 500 yds. The regulations are consistent with the Commonwealth of Massachusetts' approach regulations for right whales. These are expected to reduce the potential for vessel collisions inherent in the environmental baseline.

In April 1998, the USCG submitted, on behalf of the United States, a proposal to the International Maritime Organization (IMO) requesting approval of a mandatory ship reporting system in two areas off the east coast of the United States. The USCG worked closely with NMFS and other agencies on technical aspects of the proposal. The proposal was submitted to the IMO's Subcommittee on Safety and Navigation for consideration and submission to the Marine Safety Committee at IMO and approved in December 1998. The system will require all vessels over 300 tons to report to a shore-based station, thereby prompting a return message which provides precautionary measures to be taken to reduce the likelihood of a ship strike and locations of recent right whale sightings. The reporting system was initially implemented on July 1, 1999. The USCG and NOAA are playing important roles in helping to implement the system.

(5) Measures to Reduce Incidental Takes of Sea Turtles in Commercial Fisheries. NMFS implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles in commercial fisheries. In particular, NMFS has required the use of TEDs in southeast U.S. shrimp trawls since 1989 and in summer flounder trawls in the mid-Atlantic area (south of Cape Charles, Virginia) since 1992. It has been estimated that TEDs exclude 97% of the turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use. Recent analyses by Epperly and Teas (1999) indicate that the minimum requirements for the escape opening dimensions are too small, and that as much as 47% of the loggerheads stranding annually along the Atlantic seaboard and Gulf of Mexico were too large to fit through existing openings. On April 5, 2000, NMFS published an Announcement of Proposed Rulemaking to require larger escape openings (65 FR 17852).

In 1993 (with a final rule implemented 1995), NMFS established a Leatherback Conservation Zone to restrict shrimp trawl activities from off the coast of Cape Canaveral, Florida, to the North Carolina/Virginia border. This provides for short-term closures when high concentrations of normally pelagically distributed leatherbacks are recorded in more coastal waters where the shrimp fleet operates. This measure is necessary because, due to their size, adult leatherbacks are larger than the escape openings of most NMFS-approved TEDs. This rule was originally established because of coastal concentrations of leatherbacks which sometimes appear during their spring northward migration, but the rule was also recently implemented in the fall of 1999 off the coast of northern Florida due to unseasonal concentrations there, and leatherback TEDs were also required off the coast of Texas in the spring of 2000 due to unusual numbers of leatherback strandings there.

NMFS is also working to develop a TED which can be effectively used in a type of trawl known as a flynet, which is sometimes used in the mid-Atlantic and northeast fisheries to target sciaenids and bluefish. Limited observer data indicate that takes can be quite high in this fishery. A prototype design has been developed, but testing under commercial conditions is still necessary.

NMFS closed part of Pamlico Sound to the setting of gill nets targeting southern flounder in fall 1999 after the strandings of relatively large numbers of loggerhead and Kemp's ridley sea turtles on inshore beaches. This is a state regulated fishery. NMFS also closed the waters north of Cape Hatteras to 38° N., including the mouth of the Chesapeake Bay, to large (> 6 inch stretched) mesh gillnets for 30 days in mid-May 2000 due to the large numbers of loggerhead strandings in North Carolina. A large proportion of these loggerheads was assumed to be from the northern subpopulation. NMFS will continue to implement such proactive measures as necessary.

In addition, NMFS has been active in public outreach efforts to educate fishermen regarding sea turtle handling and resuscitation techniques. As well as making this information widely available to all fishermen, NMFS recently conducted a number of workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NMFS intends to continue these outreach efforts and hopes to reach all fishermen participating in the pelagic longline fishery over the next 1 to 2 years.

(6) Sea Turtle Stranding and Salvage Network Activities. There is an extensive network of sea turtle stranding and salvage network (STSSN) participants along the Atlantic and Gulf of Mexico which not only collects data on dead sea turtles, but also rescues and rehabilitates any live stranded turtles. In most states, the STSSN is coordinated by state wildlife agency staff, although some state stranding coordinators are associated with academic institutions. Data collected by the STSSN are used to monitor stranding levels and compare them with fishing activity in order to determine whether additional restrictions on fishing activities are needed. These data are also used to monitor incidence of disease, study toxicology and contaminants, and conduct genetic studies to determine population structure. All of the states that participate in the STSSN are collecting tissue for and/or conducting genetic and ageing studies to better understand the population dynamics of the small subpopulation of northern nesting loggerheads. These states also tag turtles as live ones are encountered (either via the stranding network

through incidental takes or in-water studies). Tagging studies help provide an understanding of sea turtle movements, longevity, reproductive patterns, *etc.*

d. Other potential sources of impacts in the environmental baseline

A number of activities that may indirectly affect listed species in the action area of this consultation include discharges from wastewater systems, dredging, ocean dumping and disposal, and aquaculture. The impacts from these activities are difficult to measure. Where possible, however, conservation actions are being implemented to monitor or study impacts from these elusive sources. For example, extensive monitoring is being required for a major discharge in Massachusetts Bay (Massachusetts Water Resources Authority) in order to detect any changes in habitat parameters associated with this discharge. Close coordination is occurring through the section 7 process on both dredging and disposal sites to develop monitoring programs and ensure that vessel operators do not contribute to vessel-related impacts.

NMFS and the U.S. Navy have been working cooperatively to establish a policy for monitoring and managing *Acoustic Impacts from Anthropogenic Sound Sources* in the marine environment. Acoustic impacts can include temporary or permanent injury, habitat exclusion, habituation, and disruption of other normal behavior patterns. It is expected that the policy on managing anthropogenic sound in the oceans will provide guidance for programs such as the use of acoustic deterrent devices in reducing marine mammal-fishery interactions and review of Federal activities and permits for research involving acoustic activities. The Office of Naval Research hosted a meeting in March 1997 to develop scientific and technical background for use in policy preparation. NMFS hosted a workshop in September 1998 to gather technical information which will support development of new acoustic criteria.

Aquaculture is currently not concentrated in whale high-use areas, but some projects have begun in Cape Cod Bay Critical Habitat and in other inshore areas off the Massachusetts and New Hampshire coast. Acknowledging that the potential for impacts is currently unknown, NMFS is coordinating research to measure habitat related changes in Cape Cod Bay and is ensuring through the section 7 process that these facilities do not contribute to the entanglement potential in the baseline. Many applicants have agreed to alter the design of their facilities to minimize or eliminate the use of lines to the surface that may entangle whales and/or sea turtles.

The *Massachusetts Environmental Trust and Massachusetts Division of Marine Fisheries* have funded several projects to investigate fixed fishing gear and potential modifications to reduce the risk of entanglement to whales. These projects are an important complement to the NMFS research effort and have yielded valuable information on the entanglement problem. The Trust has also funded research on right whales in the Cape Cod Bay critical habitat area.

Summary and synthesis of the status of species and environmental baseline

In summary, the potential for vessels, military activities, fisheries, *etc.* to adversely affect whales and sea turtles remains throughout the action area of this consultation. However, recovery actions have been undertaken as described and continue to evolve. Although those actions have not been in place long enough for a detectable change in the northern right whale population (or other listed species populations) to have occurred, those actions are expected to benefit the northern right whale and other listed species in the foreseeable future. These actions should not only improve conditions for listed whales and sea turtles, they are expected to reduce sources of human-induced mortality as well.

However, a number of factors in the existing baseline for right whales, loggerhead sea turtles and leatherback sea turtles leave cause for considerable concern regarding the status of these populations, the current impacts upon these populations, and the impacts associated with HMS fisheries (both as currently prosecuted and under the proposed amendment to the HMS FMP):

- The northern right whale population continues to be declining. Based on recent estimates this population currently numbers fewer than 300 individuals and only one calf was observed in 1999. Losses of adult whales due to ship strikes and entanglements in fishing gear continue to depress the recovery of this species.

- The leatherback sea turtle is declining worldwide. Not considering takes associated with the NMFS HMS fisheries, other sources of mortality incurred by this population exceed the 1% sustainable level projected by Spotila *et al.* (1996).

- The northern subpopulation of loggerhead sea turtles is declining and currently numbers only about 3,700 nesting females. The percent of northern loggerheads represented in sea turtle strandings in northern U.S. Atlantic states is over-representative of their total numbers in the overall loggerhead population. Pelagic immature phase animals are critical to growth of the population as a whole. Current take levels from other sources, particularly fisheries (especially trawl and gillnet fisheries), are high.

V. Effects of the Action

Analysis of effects of the proposed action

This section of a Biological Opinion assesses the direct and indirect effects of the proposed action on threatened and endangered species or critical habitat, together with the effects of other activities that are interrelated or interdependent (50 CFR 402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

Several protected species impact assessment documents prepared by NMFS or the Council(s) have bearing on this assessment of the potential impacts of the proposed HMS management actions under the MSFCMA on marine mammals and sea turtles. An assessment of impacts of the HMS fisheries on endangered and threatened species of whales, sea turtles, and fish is presented in the DSEIS prepared by HMS (NMFS 1999b). Additional discussion of entanglement in gear types used in HMS fisheries has been provided in past consultations on this fishery (as listed above), the draft EA on the Atlantic Offshore Cetacean Take Reduction Plan, the EA and subsequent Biological Opinion prepared for the Atlantic Large Whale Take Reduction Plan (NMFS 1997, g and h, respectively), and the Interim Final Rule and the informal consultation conducted on the Final Rule implementing the ALWTRP (NMFS 1999a). For a complete list and description of gear types used in this fishery, please refer to Appendix II.

Effects of the Fishery as it Currently Operates

Factors to be Considered

Stress and survivability studies have been conducted on the Hawaii pelagic longline fishery and the Atlantic shrimp trawl fishery. Sea turtles captured in the Hawaii longline fishery may suffer stress from internal or external hooking injuries and continued submergence. Sea turtles in the Atlantic shrimp trawl fishery are forcibly submerged by the trawls and kept submerged for long periods, often resulting in high mortalities. As noted previously, Balaz (pers. comm.) recorded that post-release mortality exceeded 44% for deeply hooked sea turtles that had been dehooked, treated and released from pelagic longline gear in the Hawaii fishery. Therefore, post-release mortality may be higher than the 29% cited by Aguilar *et al.* (1995).

Analysis of Effects of the Proposed Action

Sea turtle bycatch estimates from observations of takes in the pelagic longline component of the swordfish/tuna/shark fishery number in the thousands. The incidental take estimates anticipated in Scott and Brown (1997), used in the last Biological Opinion, were revised and updated by estimates provided in Johnson *et al.* (1999) and Yeung (1999). The estimated numbers for all species of sea turtles are provided in Table 2. below. These estimates are little changed from those used in developing the previous (April 23, 1999) biological opinion, and are provided as background in understanding the magnitude of take NMFS believed to be occurring in the fishery.

However, subsequent to the analyses noted above, the NMFS SEFSC developed an improved method (Brown 2000) for estimating swordfish catch which pooled across quarters, years and areas rather than the previously used method (also followed for protected species bycatch estimation) which assumed zero catch in areas not sampled. The SEFSC then followed with reworked estimates of protected species bycatch (Yeung *et al.* in prep.) following the Brown (2000) method but with pooling priorities selected as appropriate for these species. Although peer review and refinement of the manuscript is not yet complete, NMFS believes this methodology to be more accurate and appropriate than that used in previous analyses of these data, as not accounting for effort in areas unobserved obviously would ensure negative bias in the estimates. The Yeung *et al.* (in prep.) data, although preliminary, are reported below (see Table 3., as modified from Yeung *et al.* (in prep.) as the revised take estimates are substantially higher than those previously reported, thus significantly elevating the degree of concern regarding levels of protected species bycatch in this fishery, and in the case of sea turtles, particularly with respect to loggerheads and leatherbacks.

The previous estimated take for all species combined (pooled within areas) was 730 (337-1824, 95% CI) in 1998, with a high of 3,136 (2,325-4,260, 95% CI) in 1995. Of these, the estimated number in the bycatch that were released dead ranged from 0 in 1995-1997 to 60 (11-307, 95% CI) in 1992 (note: this does not account for death that may occur after the release). These totals include unidentified turtles not listed in the table. Most marine turtles were caught from the Grand Banks (NED) fishing area, outside of the U.S. EEZ. These estimates include the loggerhead, leatherback, Kemp's ridley, hawksbill and green sea turtles (see Appendix III). However, the records of the Kemp's ridley, hawksbill and green captures may have been misidentifications and should be re-evaluated (see Hoey 1998; Witzell 1999).

For 1998, Yeung (1999) provided estimates for the number of sea turtles "seriously injured", *i.e.*, those not expected to survive. Pooling across species but stratified by area, an estimated total of 730 sea turtles were taken (this estimate differs from the estimate provided in Table 2, below, because of differences in the procedures used to sum the estimates). Of these, Yeung (1999) estimates that all but 10 were seriously injured. This is a much greater predicted mortality rate than that reported by Aguilar *et al.* (1992). Yeung's (1999) criteria for determining serious injury were based on criteria developed for marine mammals (Angliss and DeMaster,1998) and may be overly conservative for sea turtles. These values still use the "old" methods of estimation (*i.e.* data were not pooled across quarters, years or areas).

Table 2. Estimated Sea Turtle Takes Recorded in the U.S. Atlantic and Gulf of Mexico Pelagic Longline Fishery for Swordfish, Tuna and Sharks, 1992 - 1998 (based on estimates in Johnson *et.al.*, 1999 and Yeung, 1999b, summed from estimates stratified by species and area).

Species	**Loggerhead**		**Leatherback**		**Green**		**Hawksbill**		**Kemp's**		**Sum Total****
Year	Total	Dead*	Total	Dead*	Total	Dead*	Total	Dead*	Total	Dead*	
1992	247	18	871	87	129	18	30	0	0	0	1295
1993	374	9	889	12	25	0	0	0	0	0	1315
1994	1279	12	700	12	24	0	0	0	15	0	2047
1995	2169	0	925	0	31	0	0	0	0	0	3290
1996	410	0	674	0	0	0	0	0	0	0	1084
1997	329	0	357	0	0	0	13	0	23	0	765
1998	472	0	169	0	0	0	77	0	0	0	718

* Does not account for death that may occur after release, which several studies have shown to be 29-33%
**Totals include unidentified turtles not listed in the table.

Numbers for takes estimated using the preferred pooling order (quarter, year, area) and number of pooled samples (n = 5) selected by Yeung *et al.* (in prep.) are discussed hereafter, although summary data across years for all methods reported, where pooling of data was performed to extrapolate take over unobserved areas, yielded similar results. Total take reported for loggerheads, over the period 1992 - 1998, was 6,544, with a lower confidence interval of 3,152 and an upper confidence interval of 15,866 for the seven-year total. Totals for the most recent year available (1998) yield an estimate of

987 loggerheads taken (95% CI = 354 - 2,866). For leatherbacks, an estimated total of 5,003 turtles were taken over the same time-period, with lower and upper confidence limits of 2,014 and 14,420, respectively. For 1998, there were an estimated 394 leatherbacks taken (95% CI = 117 - 1,408). Estimates for 1999 are likely to be considerably higher than these estimates.

Preliminary information from observer data for 1999 indicates that 45 leatherbacks, 64 loggerheads and 3 unidentified turtles were observed taken; 1 of the loggerheads was dead when boated (NMFS unpublished data). The location of the hook was not always recorded (N=60) and thus it is assumed that all animals for which this information was not recorded were seriously injured. Thus, 19 of 45 (42%) leatherbacks, 50 of 64 (78%) loggerheads and 1 of 3 (33%) unidentified turtles were assumed to have ingested the hook and were seriously injured or dead. In addition, many animals were released with line still attached, which may also contribute to subsequent mortality.

As noted above, at 3% observer coverage, take levels documented in 1999 indicate that up to 50 loggerheads and 19 leatherbacks were observed "hooked by ingestion" or moribund upon release. and up to 83 loggerheads and 32 leatherbacks would have been observed "hooked by ingestion" or moribund at a 5% level of coverage. The lower figures were calculated based on an assumption of 5% observer data. However, only about a 3% coverage level was obtained (G. Scott, pers. comm.), so the observed levels of take would have been considerably higher, had the required 5% coverage level been achieved (as represented by the higher numbers). Table 4. depicts the observed levels of take for 1999. Extrapolated data for 1999 have not been evaluated in time for this opinion.

While a determination of whether an animal meets the criteria of "hooked by ingestion or moribund when released" can be somewhat subjective, from the limited detail regarding entanglements provided on observer forms, in most cases the animal's status is very clear (e.g. comments indicating "hooked in gullet", or would be clear if this level of detail is provided. Additionally, where enough detail is not provided, NMFS should be taking the risk averse approach and assuming the injury may be serious enough to eventually incur death.

For the loggerhead turtle and for all sea turtle species, juvenile survivorship to maturity and adult longevity are critical to population growth. For the loggerhead turtle with an especially long pelagic stage, a reduction in mortality over the 7-12 years that the stage spans, during which it is vulnerable to incidental take by this fishery, is especially critical (Heppell *et al.* in prep).

Witzell (1999) summarized turtle catch from logbook data (1992 - 1995) for sets targeting swordfish and tuna, or both. The Northeast Distant Area accounted for 70% of the loggerhead and 47% of the leatherback captures that were reported north of the mid-Atlantic Bight. June through November were the peak months for reported captures. A review of observer reports for sets targeting all species between 1990 - 1996, yielded similar results (Hoey, 1998). The Northeast Distant accounted for 75% of the loggerhead and 40% of the leatherback captures for all sampling areas. The Northeast Distant Area also was the only area where interactions of four or more turtles occurred on a single set. July through November were the predominant months for turtle captures (Hoey 1998).

It has been suggested that the use of lightsticks is associated with the incidental take of sea turtles in pelagic longline fisheries (Witzell and Cramer, 1995; Price, 1995). Examination of logbook data indicated that CPUE for leatherbacks and loggerheads doubled with the use of light sticks (Witzell and Cramer, 1995). However, Hoey's 1998 analysis of Atlantic pelagic longline observer data from 1990 - 1996 indicated that light stick use had little bearing on levels of sea turtle bycatch. For the Hawaii longline fishery, Skillman and Kleiber (1998) were unable to predict turtle capture based on lighstick use. The use of lightsticks was associated with a number of other more significant predictor variables, e.g. latitude and fishing for swordfish (Skillman and Kleiber, 1998). Preliminary results of a study on the response of post-hatchling loggerheads to light sticks indicate that the turtles were strongly attracted to glowing green light sticks and were weakly attracted to glowing yellow Coghlan light sticks; methodology developed for testing these animals needs to be applied to older animals (Wang *et al.* 2000).

NMFS held a workshop in Miami on August 31- September 1, 1999, to discuss monitoring the number of turtles taken and killed in the pelagic longline fisheries in the two ocean basins and to discuss steps that could be taken to reduce the takes. The report (Kleiber *et al.*, in prep.) lists recommendations for data collection. For the Atlantic (1) the color of the light sticks should be recorded; (2) the position of takes in relation to floats and light sticks must be recorded; and (3) an estimate of the length of line remaining on the turtle when released should be made. To date only (3) has been implemented in the Atlantic. The report further recommends prioritized avenues of research to both reduce turtle takes in the longline fisheries and improve the survival of turtles taken. Recommendations to reduce takes included targeted closures to selectively achieve a reduction in effort where takes were particularly high, setting hooks deeper in the water column, restrictions on time of day that the lines soaked and were fished, experiments/analyses to determine takes relative to floats or light sticks and to determine vulnerability relative to time of day, some hook testing, and research on turtle deterrents (*e.g.*, dyed bait). Recommendations to improve survival included changes in the hooks used (circle vs. J and highly corrodible), increase in gangion line length, removal of all line from turtle before release, shortened soak times, and improved handling guidelines.

There are few sources of information on the level of mortality caused by the pelagic longlines. In the Spanish pelagic longline fishery, the minimum mortality due to ingestion/internal hooking (84% of the loggerheads captured had ingested the hook) was estimated to be 29% (Aguilar *et al.*, 1995) in addition to the mortality associated with drowning while hooked (4 of 1098 animals). Post-hooking mortality studies in both the Atlantic and Pacific, based on satellite-tag transmissions of deeply (ingested) and lightly (mouth or foul hooked) hooked turtles of all species (mostly loggerheads), indicate that 29% (11 of 38) died (Balazs, pers. comm.; Polovina *et al.*, in press; Bjorndal *et al.*, 1999); 11 of 25 (44%) deeply hooked animals failed to transmit signals from their satellite transmitters after being released; the assumption is that they died and remained submerged. The deeply hooked animals tracked by Balaz had all lines removed and were dehooked where possible, prior to release, thus 44% is likely an underestimate of mortality for deeply hooked animals. The transmissions of the remaining 14 were no different from the transmissions of 13 lightly hooked (in mouth, beak, or flipper) and thus it is assumed that all lived. Sea turtle mortality reported due to drowning in the Mexican tuna longline fishery in the Gulf of Mexico was 33% (Ulloa Ramirez and Gonzáles Ania, in press) and there is no estimate of post-hooking mortality in that fishery. Therefore, based on the total estimated catch and a 29% mortality rate, 593 and 954 turtles may have died in 1994/1995. This is likely a minimal estimate.

Table 3. Comparison of the estimates of total bycatch by species and year among the pooling treatment of zero observer effort strata using two different pooling orders: qyn and yqn, (q=quarter, y=year, n= NAREA: the order from left to right represents the pooling priority) and two different minimums for observed sets: 5 and 30 (qyn5 is used in the Yeung *et al*. (in prep.) report as it requires less pooling from more distantly related samples). Estimates using the omission treatment (omit, *i.e*., estimate assigns zero values to areas not sampled) used in Johnson *et al*., 1999, Table 10 and in Yeung, 1999, Table 5) are also listed.

Species	Year	qyn5	qyn30	yqn5	yqn30	Omit
Unid. turtle	92	30	30	37	34	
	93	27	30	27	27	28
	94	33	20	33	21	19
	95	135	79	135	80	
	96	7	25	7	26	
	97	41	58	41	62	19
	98	4	23	2	30	
	Total	**277**	**265**	**282**	**280**	**66**
Green	92	90	67	78	56	37
	93	29	38	29	48	32
	94	29	36	27	51	25
	95	35	8	34	23	
	96	19	27	27	35	
	97	4	10	1	5	
	98	14	23	12	18	
	Total	**220**	**209**	**208**	**236**	**94**
Hawksbill	92	26	23	20	20	15
	93					
	94				3	
	95		2		1	
	96	3	8	1	3	
	97	13	4	13	5	13
	98	13	4	13	7	13
	Total	**55**	**41**	**47**	**39**	**41**
Kemp's ridley	92	1	4	1	4	
	93					
	94	23	24	23	24	19
	95		3			
	96	3	6	1	6	
	97	18	20	18	18	17
	98	1	3		2	
	Total	**46**	**60**	**43**	**54**	**36**
Leatherback	92	941	811	764	925	350
	93	992	945	993	880	876
	94	763	755	774	693	477
	95	874	953	877	959	880
	96	726	747	782	815	36
	97	313	405	319	453	51
	98	394	532	435	609	181
	Total	**5003**	**5148**	**4944**	**5334**	**2851**
Loggerhead	92	215	790	188	932	88
	93	392	635	389	483	388
	94	1299	1460	1274	1296	346
	95	2233	2124	2231	2005	1418
	96	957	933	986	965	118
	97	461	534	417	500	201

Species	Year	qyn5	qyn30	yqn5	yqn30	Omit
	98	987	902	1018	954	516
	Total	**6544**	**7378**	**6503**	**7135**	**3075**

Table 4: Observed Levels of Loggerhead and Leatherback Sea Turtles Taken Incidental to Commercial Pelagic Longlining for Swordfish and Tuna in the U.S. Atlantic Fleet in 1999.

Species	Total Observed Takes	Anticipated Take by Hook or Ingestion	Actual no. Observed Dead or Taken by Hook or Ingestion[1]	No. taken by Hook or Ingestion if Scaled[2] to 5% Effort Level	Estimated[3] no. Taken by Hook or Ingestion, Extrapolated[2] to 5% Coverage Level	Amount ITS Exceeded Actual and Estimated ()
Loggerhead	64	23	50	83	32	60 (9)
Leatherback	45	11	19	32	22	13 (11)

[1]Observer logs in most cases were not detailed enough to determine whether or not a mouth hooked animal was "hooked by ingestion"; thus to be conservative, cases which were unclear were considered as "hooked by ingestion".
[2]Number observed * 5% level desired/3% achieved.
[3]Based on 29% of Total Observed Takes (per post-release mortality estimates provided by Aguilar *et al*., 1995)

The numbers under the "actual number observed dead or hooked by ingestion" column in Table 4. above, minus the one mortality (*i.e.* the deeply hooked animals) represent 62.5% of the total observed takes. Multiplying this by the 44% mortality estimate observed by Balaz (pers. comm.) for deeply hooked animals yields an overall estimate of 27.5% mortality for this fishery, thus reinforcing the 29% figure reported by Aguilar *et al.* (1995) as a good, conservative estimate of minimum mortality.

The regulations implementing the HMS FMP include measures implementing provisions of the AOCTRP, as noted in the description of the proposed action above (*i.e.* a requirement that fishermen move after an interaction, a one-year limit on the length of gear set in the mid-Atlantic statistical area, limited entry, and education/outreach).

Although the AOCTRT recommended closure of right whale critical habitat by the longline fishery and the (then existing) pair trawl and pelagic drift gillnet fisheries, NMFS' Office of Sustainable Fisheries, in consultation with F/PR, concluded that as these critical habitat areas encompass state waters, this recommendation would more appropriately be implemented under the MMPA. Currently, the pelagic longline fishery does not generally overlap in time or space with right whale distribution. Additionally, NMFS has no records of large whale entanglements in pelagic longline gear. Although due to low levels of observer coverage, it is possible that interactions go unrecorded. The NER entanglement database does include records of five anecdotal accounts of humpbacks having been entangled in longline gear of various types (some were released alive by fishermen). Therefore, NMFS does not presently view the seasonal closure of right whale critical habitat proposed by the AOCTRT as a critical measure to prevent this fishery from interacting with right whales or other large whales, but such a closure would prevent future expansion of effort into these areas during these seasons, not only ensuring that no interactions with right whales occur, but also precluding interactions with other listed species from expanding into these times and areas.

Requiring fishermen to move after an interaction with not only a marine mammal, as recommended by the AOCTRT, but following an interaction with a sea turtle as well (as now required in the HMS FMP), is intended to mitigate for the contagious distribution of marine mammal and sea turtle takes noted in the observer data set. If fishermen comply with this provision, according to industry representatives familiar with the observer data set, there could be up to a 40% reduction in levels of serious injury and mortality of strategic stocks of marine mammals. Hoey (1998) noted that for the Northeast Distant fishing area, 68.1% of all loggerheads observed entangled in pelagic longline gear were caught on sets with other loggerheads. For leatherbacks, 31.7% were caught on sets with other leatherbacks. Thus, HMS' adoption of this measure as a requirement could substantially decrease incidental take levels with both marine mammals and sea turtles. However, as NMFS noted in the HMS FMP, this measure will be extremely difficult, if not impossible to enforce. Given this extreme difficultly, NMFS is hopeful that, provided with education, some fishermen may comply voluntarily and the continued promotion of protected species conservation effected via the educational outreach/workshop efforts discussed below, an increased level of compliance with this requirement may be achieved. However, without at least having an observer onboard (and hence the threat of being reported to NMFS following a trip) there is no way to ascertain that fishers will comply with this provision.

Fisherman Education and other Outreach Efforts should help fishermen to become more aware of, and sympathetic to, conservation matters relating to their fishery, to gain a deeper understanding of how their fishing activities affect the marine environment, and, through a better understanding of protected species biology and habits, dehooking, disentanglement and resuscitation techniques, etc., learn how to decrease their level of impact on protected species as much as possible. The "Captain's Report (Hoey and Moore, 1999) outlines several measures which the authors state, according to the data, should be quite effective at not only reducing sea turtle take rates, but also should improve the fish catch composition with respect to target species vs. bycatch species and undersized swordfish. Developing fisherman understanding and support of these concepts could lead to actions on the captains' parts which should substantially minimize the incidental take levels for sea turtles. Although it is impossible at this point to estimate how much these outreach efforts may impact incidental take levels, it is hoped that a measurable difference will be achieved. NMFS believes that, at a minimum, such outreach efforts will foster better communications and understanding and cooperation between the fishermen and NMFS protected species management personnel, which may result in meaningful levels of decrease in protected species bycatch.

Another provision of the current FMP, to implement the AOCTRP, is a one-year limit on the length of gear set in the Mid-Atlantic Bight (to 24 nm from August 1 – November 30). This provision is also difficult to analyze in terms of potential levels of bycatch reduction. As the HMS FMP notes, of those vessels observed in 1996 and 1997, the average length of mainline fished by pelagic longline fishermen was 20.3 miles and 21.7 miles, respectively. Additionally, the HMS FMP states that some fishermen have indicated that they would offset any losses due to this requirement by re-rigging their gear to maintain the same number of hooks per set, but on shorter line. If this measure results in effort reduction, as previously believed by AOCTRT members, then lower bycatch numbers may result. However, if as NMFS' expectations suggest, this restriction on length of gear does not change the total level of effort in the fishery, then little to no change in the existing take rates for sea turtles would be expected. This provision has not been implemented long enough for there to be any data available from which to assess its effectiveness.

Additional Effects of the Proposed Action

There is no information available to determine possible effects of the prohibition on live bait. However, the practice and prohibition extend only to the Gulf of Mexico, where take bycatch rates are generally lower than in the NED, NEC and MAB sampling areas; therefore this provision is not likely to have much effect, if any, on sea turtle bycatch rates.

Table 5. Impact of time/area closures on sea turtles based on logbook reports of pelagic longline sets, 1995 through 1998. Turtles caught, used in the DSEIS analysis, represents the total number of turtles caught, turtles injured and turtles killed for all species of sea turtles.

5.A. Charleston Bump (February through April) and East Florida Coast (year-round)

		Turtles Caught But NOT Injured		Turtles Injured		Turtles Killed	
	Turtles Caught[2]	Leatherbacks	Loggerheads	Leatherbacks	Loggerheads	Leatherbacks	Loggerheads
Total Atlantic	2792	719	1785	3	35	10	3
No Effort Redistribution	-1.64%	-1.67%	-0.78%	0.0%	0.0%	0.0%	0.0%
Expected Change[1]	2746	707	1771	3	35	10	3
Effort Redistribution	7.13%	8.09%	7.43%	7.01%	10.78%	8.07%	17.15%
Expected Change	2991	777.2	1917.7	3.2	38.8	10.8	3.5

[1]Expected Change means the predicted change in catch (takes) based on the no effort redistribution model or effort redistribution model. Positive values for the models indicate a predicted INCREASE in catch, while negative values are indicative of a predicted DECREASE in catch. All changes are based on Atlantic-wide levels.
[2]Turtles Caught are values provided in the draft of the FSEIS

HMS provided an analysis of the effects of the proposed closures, under the assumption of no effort redistribution and under the assumption of random redistribution of effort. These results (provided in Tables 5.a. and 5.b. below) indicate that overall, a 7.13% increase in turtle bycatch is expected as a result of implementing the proposed closures, based on the random effort redistribution model. However, it is more likely that effort would be redistributed disproportionately to neighboring areas, unless precluded by seasonal or weather related considerations. For example, there is concern that the South Atlantic closures could result in increased effort in more northern latitudes, where sea turtle bycatch rates are generally highest. Therefore, in the worst-case, it is likely that the proposed action could result in sea turtle capture rates elevated beyond the predicted 7.13%. These data were calculated based on fisher reported logbook data, so actual numbers of turtle takes in the dataset are likely under-reported, and the assessments (made by the fishers) of whether or not an animal was injured are probably underestimated as well. Nonetheless, these caveats would not affect estimates of overall percent change in bycatch levels.

5.B. De Soto Canyon, closed all year

		Turtles Caught But NOT Injured		Turtles Injured		Turtles Killed	
	Turtles Caught[2]	Leatherbacks	Loggerheads	Leatherbacks	Loggerheads	Leatherbacks	Loggerheads
Total Atlantic	2792	719	1785	3	35	10	3
Total Gulf of Mexico	66	27	9	0	1	1	0
No Effort Redistribution	-0.29%	-0.56%	-0.06%	0.0%	-2.9%	0.0%	0.0%
Expected Change[1]	2784	715	1784	3	34	10	3
Effort Redistribution	0.0%	-0.1%	0.0%	0.0%	-2.8%	0.5%	0.0%
Expected Change	2784	718.3	1785	3	34	10	3

[1]Expected Change means the predicted change in catch (takes) based on the no effort redistribution model or effort redistribution model. Positive values for the models indicate a predicted INCREASE in catch, while negative values are indicative of a predicted DECREASE in catch. All changes are based on Atlantic-wide levels.
[2]Turtles Caught are values provided in the draft of the FSEIS

Based on this analysis, it appears that the Gulf of Mexico (DeSoto Canyon) closure would have little if any effect on sea turtle bycatch levels, with most or all of the change resulting from the combined Atlantic closures. In particular, it appears that the number of turtles injured or killed (as opposed to the number captured) may be elevated substantially by the proposed Atlantic closures (*e.g.* a 10.78% increase in injured (as assessed by the fishermen) and a 17.15% increase in dead loggerheads, and a 7.01% increase in injured (as assessed by the fishermen) and an 8.07% increase in dead leatherbacks).

Bycatch data for the **bottom longline fishery** predominantly targeting sharks in the southeastern US were previously unavailable. However, an observer program conducted by the Gulf and South Atlantic Fisheries Development Foundation (Branstetter and Burgess, 1997) reports incidental takes of sea turtles recorded in this fishery. Between 1994 and 1996 a total of 408 sets were observed, comprising 4.1 million hook hours. It is unknown what the total effort in this fishery is, although the sharks landed via observed vessels represented between 2% and 5% of all sharks landed. According to Branstetter (NMFS, St. Petersburg, Fl., pers. com.), about 50 vessels land the majority of the quota and the fishery generally operates in 10 - 20 fathoms water depth. Approximately 50 – 55% of the total landings are recorded in Florida, followed by North Carolina and Louisiana at 20% each, Texas at about 1 - 2%, and most of the remainder from the mid-Atlantic. In the 408 sets observed, 25 loggerheads were taken and released live and another six were recorded dead. Eleven of these turtles were taken between South Carolina and Northeast Florida (South Atlantic Bight), 16 in the Florida Gulf, and four in North Carolina. Additionally, two leatherbacks were entangled and released live, one in the South Atlantic Bight area and one off North Carolina. Preliminary data from this observer program in 1998 indicate that out of 106 sets observed, two loggerheads and one unidentified turtle were taken and released live in that year (Branstetter, NMFS, St. Petersburg, FL, pers. comm.).

NMFS' aim, as outlined in the HMS FMP, implementations of the rebuilding plan for the shark fishery with reductions in quotas, unlimited access, etc., appears likely to reduce effort in this fishery. If effort is reduced, this will presumably be a positive step towards reduction of protected species bycatch as well. However, it is not possible to predict the magnitude of this change and implementation of these quotas is contingent upon outcome of the lawsuit.

The **pelagic driftnet** portion of the Atlantic swordfish fishery was prohibited during an emergency closure that began in December 1996, extended through May 31, 1997, and subsequently extended through July 31, 1998. An extensive environmental assessment was prepared to evaluate this fishery from both fisheries and protected species perspectives, to identify measures to be implemented for the longline and driftnet fisheries. The northeast swordfish driftnet segment was reopened on August 1, 1998, and a total of 10 trips were reported. An additional two driftnet trips targeting tuna took place in September using a net with smaller mesh. The final rule to close the entire swordfish driftnet fishery was published on January 27, 1999 (64 FR 4055), and a Notice of Availability for the draft comprehensive FMP for the whole pelagic fishery was published on October 26, 1998 (63 FR 57093). Under the Final HMS FMP, published May 28, 1999, this gear-type was prohibited for the harvest of tuna also, in order to prevent expansion of the use of this gear into other fisheries. Bycatch of turtles and especially of marine mammals was high in this fishery, and included a number of captures of large whales (see summary of take information provided in the May 29, 1997 and April 23, 1999 Opinions). Prohibition of this gear has significantly reduced the potential for jeopardy to right whales, and eliminated one source of injury/mortality for humpback whales, sperm whales and sea turtles.

For the **Southeast Shark Gillnet Fishery**, unpublished data from the Florida Fish and Wildlife Conservation Commission for shark gillnet landings from the coast of Florida from Nassau County to Broward County indicate that in 1998, of vessels targeting sharks (defined as those reporting landings of >500 lbs), a total of 706,510 lbs of shark were landed in 278 trips along the Florida east coast. In 1999, a total of 706,510 lbs of shark were landed in 265 trips. Prior to implementation of the ALWTRP, 121,559 lbs of shark were landed in 194 gillnet trips which took place between November 15, 1996 and March 31, 1997. Ninety percent of these landings were caught by 13 fishers landing 500 lbs or more of shark/trip, in 48 trips, indicating that these data represent shark as the target species (rather than bycatch landings). Implementation of the ALWTRP in July, 1997, subsequently closed the area from Savannah, Georgia to Sebastion, Florida to shark gillnetting, during the same time period of November 15, 1997 - March 31, 1998. Landings data for these dates in 1997-1998 indicate six gillnet fishers were landing shark, and only one of these fishers called to arrange for an observer (despite a 100% observer coverage requirement). Data through January 1999 from FDEP indicate 88 gillnet trips landed sharks and that 13 different fishers landed sharks during the 1998 portion of the right whale calving season when restrictions on shark gillnet fishing are in place (November 15 - December 31). None of these fishers called to arrange for an observer during that time period, although four fishers called and took observers beginning January 1999. FDEP data indicate only one fisher may have actually targeted sharks between November 15, 1998 and January 31, 1999, so outreach efforts in late

1998 to educate fishers regarding the call-in requirement may have been effective. The 1999/2000 season seems to have gone smoothly, with fishers regularly reporting their intentions to fish, even after observers were no longer available.

Nine sets were observed outside of the right whale season in 1998, but no sea turtle takes were observed. However, three loggerhead takes have been recorded since the fishery was first observed in 1993 (2 released live, one dead), including one this year (2000) (Carlson, unpub. data). A summary of protected species takes recorded by the observer program is provided in Table 6. below. These data include 9 sets observed in 1999/2000 outside of the right whale calving area (but where turtle takes could still occur), near Key West, Florida.

Table 6. Observed Effort in the Southeast US Shark Gillnet Fishery and Interactions with Protected Species (taken from Carlson, unpub.).

Year	Tot. no. Sets Obs.	Whales	Dolphins	Sea Turtles
1993	5	0	0	0
1994	40	0	0	2 *Caretta caretta* in 2 sets, released live
1995	7	0	0	0
1998	9	0	0	0
1999	53[1]	0	4 *Tursiops truncatus* taken in 2 sets – dead	0
2000	52[2]	0	1 *Stenella frontalis* in 1 set, released live; 1 *Tursiops truncatus* in 1 set – dead	1 *Caretta caretta* in 1 set – dead
Total	**166**	**0**	**6**	**3**

[1]including 2 observed strike net sets

[2]including 12 observed strike net sets within the "right whale observer area", and also 9 sets observed near Key West, FL, considerably beyond the calving area.

Most gillnet activity for sharks in southeast waters where right whales may occur is prohibited under the regulations implementing the ALWTRP, and were also adopted under the MSFMA by NMFS under the May 1999 rule implementing the FMP. Gillnetting is allowed in a small area off the east coast of Florida (from Sebastian south) where due to the close proximity of the Gulf Stream, right whales are not likely to occur in Federal waters (gillnetting already being prohibited by law in state waters), provided the vessel carries an observer. An exemption is also granted for strike netting for sharks under these rules, provided the captain/vessel uses a spotter pilot, fishes during daytime only, does not set gear within 3 nm of a right whale sighting, and carries an observer. Only twelve strikenet trips have been observed to date, with no protected species interactions recorded.

The HMS FMP prohibits shark fishing, year-round, without an observer onboard; thus strengthening the provisions of the ALWTRP rule. However, insufficient funds have been available to fully implement this requirement. NMFS believes that, if properly implemented, these measures greatly reduce the chances of a right whale becoming entangled, and, if an entanglement should occur, the presence of an observer ensures immediate contact with the disentanglement network to provide for release/disentanglement of the animal. However, there remains concern that additional effort may be taking place without the presence of observers. A review of the observer data for the 1999/2000 right whale calving season indicates that all observed vessels did comply with the closure. NMFS believes that a monitoring system such as VMS could also ensure compliance with the closure, leaving only a remote possibility of even encountering a right whale, much less entangling one, outside the closed area. Therefore, for purposes of ensuring the closure is implemented, VMS is a viable alternative to the 100% observers requirement during the right whale calving season. A lower, statistically-valid level of observer coverage would still be necessary to monitor for turtle takes and to cover any strike netting within the closed area.

The BFT purse seine fishery is currently listed as a category III fishery under the MMPA. This fishery was observed in 1996, with near-100% coverage. Six pilot whales, one humpback whale and one minke whale were observed as encircled by the nets during the fishery. All were released alive or dove under the net and escaped before it was pursed. Additionally, unpublished data from NMFS' Northeast Region's entanglement data base indicate that 3 humpback whale entanglements were attributed to this fishery in 1985. All were considered injured (undefined), but all were released and resighted.

Purse seines are set when a school of fish is located, after which the vessel pays out the net in a circle around the school. This affords considerable control over what is encircled by the net and the net does not remain set in the water for any amount of time. Therefore, this gear type is not likely to result in mortality or serious injury of marine mammals or sea turtles. However, due to similarity of the gear with that used to catch tuna in the Eastern Tropical Purse-seine fishery, there is concern that potential for lethal interactions with these listed species exists (Darryl Christensen, NMFS, Woods Hole, MA, pers. comm.). This fishery operates from about 8 km to about 200 km offshore, between Cape Hatteras and Cape Cod, as well as further up the New England coast, for a brief season beginning August 15, and therefore could potentially operate in the same area and time as right whales, although most right whales are generally distributed to the north of Cape Cod during this time period. Although the potential of an interaction between this fishery and right whales is slight, heightened awareness of the right whale's status indicates that perhaps this fishery should be re-examined. NMFS's proposal to observe the fishery should help collect data to determine whether concern over potential for protected species interaction in this fishery is warranted.

The **harpoon/handline/rod-and-reel gear fisheries** are listed as category III fisheries under the Marine Mammal Authorization Program due to their remote likelihood of interaction with marine mammals. Although a few reports of entanglement in handline and harpoon gear exist, these were likely non-injurious entanglements from which the whales could easily disentangle themselves or be disentangled. Increased development of the Disentanglement Network under the ALWTRP should provide adequate mitigation for these infrequent (and thus far, non-lethal) entanglements.

Turtles are also known to become hooked in rod-and-reel fisheries, again, at relatively low rates in comparison with longline or gillnet fisheries. Recreational hook-and-line fisheries have been known to lethally take sea turtles, including Kemp's ridleys. In a study conducted by the NMFS Galveston Laboratory between 1993 through 1995, 170 ridleys were reported associated with recreational hook-and-line gear; including 18 dead stranded turtles, 51 rehabilitated turtles, 5 that died during rehabilitation, and 96 that were released by fishermen (Cannon and Flanagan 1996). Witzell and Teas (1994) reported that of a total of 197 turtles necropsied throughout the Gulf of Mexico and the Atlantic seaboard, 94 of then had ingested fish hooks and/or monofilament fishing line).

Similarly, the NMFS Beaufort Lab's public sighting data base for North Carolina (unpubl. data) reports interactions between hook-and-line gear and sea turtles from 1988-1996. These data include records of 98 turtles hooked, including 65 loggerheads, three greens, 12 Kemp's ridleys, three leatherbacks, and 15 of unknown species. All of these turtles were released alive, but information on condition/status of these turtles following the interactions is unavailable. It is unknown whether interaction rates between sea turtles and this gear type in pelagic waters where HMS fisheries are prosecuted are comparable to what has been noted in these coastal areas, but certainly occasional interactions are possible.

Starting in June 1999, the HMS FMP closed a 1° X 6° block within the Mid-Atlantic Bight area to the pelagic longline fishery to minimize discards of BFT in the fishery. The closure was analyzed by HMS with respect to possible impacts to sea turtles. The analysis was performed on a 4° X 4° block at 36° - 40° N and 70° - 74° W, which was HMS's original proposal. The displacement model analysis used showed that the change in sea turtle bycatch (due to associated shifts in effort in the longline fishery) was year dependent (probably depending upon other factors controlling distribution of effort in the fishery). Effort shifts and resulting estimates of sea turtle take levels were examined for three different data sets for 1992-1995 (collectively), 1996, and 1997. The resulting sea turtle take estimates increased 9% due to the projected shifts in effort using the 1997 data set, decreased 7% using the 1996 data set, and increased 8% using the combined data set for 1992- 1995. Without controlling for effort between years but simply taking a mean change in take per year, assuming an 8% increase per year in each of the years from 1992-1995 (all of which may not be valid assumptions), a gross estimate of the mean annual change in sea turtle bycatch, based on the HMS modeling results, would be a 6% increase in overall turtle bycatch (no breakdown analysis by species was provided, so it is unknown how effort shifts resulting from this closure may affect capture rates for individual species). The closure actually implemented shifts the area slightly (2°) westward of the area analyzed, but restricts it to a 1° latitudinal band. This lateral compression of the closed area is likely to prevent much of the predicted effort shift into the Grand Banks area, and therefore may reduce subsequent increases in sea turtle takes in this high bycatch area. The final FMP did not become effective until just before this seasonal fishery was to open, so it is doubtful that the Plan had any effect last year. Data from the 2000 season should be examined to determine the effect of the closure on sea turtle bycatch.

Additional Effects of Specific Management Measures considered by NMFS, outlined in the HMS DSEIS, and additional materials.

The analysis of effects of the closed areas proposed by HMS, as provided in the DSEIS and subsequent draft advisory documents, indicate that displacement of effort could increase sea turtle bycatch by an estimated 7.13%. However, the analysis was based on a random redistribution of effort model, which is not likely to be representative of what actual effort redistribution patterns. Based on proximity (assuming that a fisher would most likely to redirect effort to the nearest available (*i.e.* "open") port, Gulf of Mexico fishermen would likely fish in the western Gulf, while Atlantic fishers would choose between the Caribbean, Offshore Southeast, or Northeast management areas (especially the southern end of the area). Due to weather conditions during the time-frame of the proposed closure, effort redirection to the north (particularly the NED) is unlikely. However, the mid-Atlantic Bight area (Northeast Coastal, or NEC) has historically had the second highest sea turtle incidental take levels, so some effort may redistribute there, particularly from the Charleston Bump area, and this would undoubtedly elevate sea turtle bycatch levels.

The effects on sea turtles of the proposed prohibition on live bait are equally unknown. If visual cues predominate in attracting a sea turtle to gear (*e.g.* as with light stick attraction), this prohibition may help decrease sea turtle bycatch levels.

The current *HMS requirement for use of VMS and gear marking for all HMS pelagic longline fisheries* (which should be implemented on September 1, 2000) should facilitate monitoring of the proposed management measures, encourage greater compliance, and may even provide valuable data on entanglements. These measures, therefore, may slightly reduce sea turtle bycatch, and provide information which could be used in preventing or reducing effects of entanglements in the future (e.g., through gear development strategies or other measures). Extension of this requirement into the shark gillnet component of the HMS fisheries should further enhance overall bycatch reduction efforts.

A proposed shark gillnet fishery which would use 8"-12" mesh, $\geq$ 2,000 yard nets and operate off the coast of Alabama, if prosecuted, would add to the current take levels analyzed, to an unknown degree. It is possible that fishers prohibited from longlining would continue to fish in the closure area, using gillnets to target sharks. If this scenario is realized, elevated incidental take levels for protected species, including proportionately more lethal takes of sea turtles, could be the result.

The overall effects of observed and estimated lethal and non-lethal takes of sea turtles over the past several years on the survival and recovery of listed species are difficult to quantify, however, since the continued operation of the HMS fisheries is anticipated to result in similar levels of lethal and non-lethal take. Although there are genetic data from animals foraging along the Atlantic seaboard and in the vicinity of the Azores and Madeira (where the northern subpopulation of loggerheads are disproportionately represented), there are no genetic data from any animals captured in any of the North Atlantic fisheries, including the HMS fisheries, and no data from the areas where the pelagic longline fishery is operating; in the absence of this information one must assume that all the animals being taken are from the most endangered subpopulation. With respect to loggerhead sea turtles, NMFS currently believes that the continued operation of these fisheries at current levels of take is not likely to appreciably reduce the likelihood of survival and recovery of the entire species in the wild. However, the proportion of take from the northern subpopulation of loggerhead sea turtles, as a result of the continued operation of this fishery, has not yet been determined but due to the numerous uncertainties, the importance of the pelagic phase to the species' life history, the disproportionately large representation of this subpopulation in coastal waters of the mid- and north Atlantic which are subject to a considerable degree of fishery interaction, and the observed continued decline of the population, removals from this population from the pelagic longline fishery at current incidental take levels may cause an appreciable reduction in the numbers, reproduction, and distribution of the Atlantic leatherback sea turtle and the northern subpopulation of loggerhead sea turtles in the wild.

Species' response to effects of the proposed action

Mortalities of sea turtles as a result of the continued implementation of the HMS FMP, and the proposed regulatory amendment, may have significant long-term effects on the affected population. Other than the obvious impact of a loss of several individual turtles, each mortality also result in the loss of the reproductive potential of that turtle. NRC (1990) estimates that the reproductive value of an adult loggerhead is 584 times that of an egg or hatchling, because so few eggs or hatchlings survive to maturity. Sea turtles are long-lived and delay sexual maturity for several decades. Loggerheads and green turtles may reach sexual maturity as early as 22 or 30 years of age, or as late as 30 to 60 years of age, respectively. Females of each species lay approximately 100 eggs per clutch in 2 or 3 clutches every 2 to 4 years. Thus, the death of adult or juvenile females could potentially preclude the production of hundreds of hatchling turtles, though most of these would not survive to sexual maturity. NMFS is not aware of a disproportionate mortality of adult female turtles in the pelagic longline fishery. Mortalities of adult or large juvenile males would preclude their contribution to future generations, though it is difficult to quantify this impact given the minimal data on male sea turtles. As described below, current mortalities of loggerhead and leatherback sea turtles in the North Atlantic pelagic longline fishery are relatively high; therefore, the lost reproductive potential as a result of accidental sea turtle mortality in the continuing pelagic longline fishery is likely to appreciably reduce the numbers, distribution, and reproduction of loggerhead and leatherback sea turtles in the Western North Atlantic.

Because the abundance, distribution, and the migration and foraging patterns vary so significantly between the sea turtle species that may be encountered by pelagic longliners in the NED, their vulnerability to fishing operations will also vary. The following sections review the possible impacts of the proposed action on each of the sea turtle species.

Effects on Loggerhead Sea Turtles

Since loggerheads are the most abundant sea turtle in the northern Atlantic, it is not surprising that they are the most commonly caught species in the pelagic longline fishery. The incidental take of loggerhead turtles by the pelagic longline fishery is high (Table 3). This may be due in part because loggerheads are known to congregate in warm eddies to forage in northern Atlantic waters. From 1992-98, the pelagic longline fishery is estimated to have captured/entangled/ hooked 6,544 loggerheads, of which an estimated 40 were observed as moribund or dead prior to release. An additional 1858 loggerheads are estimated to have been seriously injured and died following release (assuming a 29% mortality rate per Aguilar *et al.* (1995)). As described in the Status of the Species, most of these turtles were pelagic immatures. Genetic information on loggerheads caught in the north Atlantic longline fishery is unavailable, however, 25-59% of loggerheads on foraging grounds from the north Atlantic to Georgia are estimated to have originated from the northern subpopulation. The percentage of loggerheads taken by north Atlantic pelagic longliners originating from the northern subpopulation of loggerheads is likely higher. Genetic studies conducted off the Azores Islands (east of the Grand Banks) suggest that at least 19% of the turtles taken by dipnet originated from the northern nesting subpopulation, which is more than twice the 8.5% portion this subpopulation represents of the total U.S. nesting population. NMFS has assumed that loggerhead turtles caught by pelagic longlines in the northern Atlantic are most likely pelagic immatures and they most likely originate from the northern nesting subpopulation of loggerheads. Based on past fishery performance (1992 - 1998), NMFS anticipates that, on average, 935 loggerhead turtles may be incidentally captured during the pelagic longline fishery annually, 16 of which, on average, may be observed as moribund or dead at release. Assuming that loggerheads have the same survival rate (approximately 29 percent) of the aggregate species, it is likely that a significant number of hooked and released loggerheads would have been seriously injured and die. If 29 percent of the loggerheads captured may be killed or injured by the northern Atlantic pelagic longline fishery, it is possible that an additional 255 loggerhead turtles, on average, may be killed every year. These estimates do not consider our estimates, which project an additional take of up to 80 loggerhead turtles associated with the proposed action.

Other HMS fisheries may take small numbers of sea turtles, but with the exception of the bottom longline fishery for sharks or the shark gillnet fishery where data are too limited, the numbers are almost inconsequential in comparison with the levels of takes currently recorded in the pelagic longline fishery. Likewise, the bottom longline fishery for sharks may take more turtles than are indicated by current data (between 1994 and 1996, 31 turtles were taken in 408 sets; 25 of which were released alive and 6 of which were dead), but no effort information is available from which to base an estimate. However, observed sets are presumed to represent between 2 - 5% of total shark landings, so a direct scaling of the available data (which probably is not an accurate way to extrapolate the data) would indicate that between 620 - 1550 loggerheads could be taken in this fishery over 3 years, or 207 - 517 annually (this likely represents an over-estimate, as these rough figures are based on total shark landings, which includes gillnet and bycaught shark landings in addition to those targeted on bottom longlines). It is important to begin monitoring this fishery in such a way that effort can be estimated and more accurate take estimates for sea turtles can be derived.

From the limited data available, there are no turtle takes recorded in the purse seine fishery, nor the harpoon or other hand gear fisheries. No takes specific to HMS rod-and-reel fisheries have been documented, but as takes are occasionally documented on such fisheries in general, it is likely that rod-and-reel fisheries sometimes interact with sea turtles as well.

Effects on Leatherback Sea Turtles

As discussed in the Status of the Species section, overall population estimates for the western Atlantic leatherback population have declined in recent years, and some nesting populations are known to have declined, including the major nesting area in Surinam-French Guiana, and others have been extirpated, although numbers on some nesting beaches, such as St. Croix, are up. Most of the leatherbacks which occur in the action area for HMS fisheries probably originate from the Surinam-French Guianas nesting area, which has been declining since 1992. Although in 1999, NMFS described the U.S. female nesting population as a mere 160 individuals (Florida, Puerto Rico, and Virgin Islands combined), these U.S. populations are probably more protected than the larger nesting populations in the western, and especially eastern, Atlantic.

The pelagic distribution of leatherbacks in northern Atlantic waters is also not well known; however, leatherbacks are found throughout the entire area managed by HMS fisheries and, when found, are generally associated with cooler waters at higher latitudes. Leatherbacks are rarely seen in the Gulf Stream. Unlike loggerheads which are primarily vulnerable to HMS fisheries during their pelagic immature phase (ages 7-12), leatherbacks are pelagic during all life stages. This characteristic increases the duration of their exposure to pelagic fishing gears throughout their life history. The highest numbers of leatherbacks taken in HMS fisheries occurred during the fall season in the pelagic longline component in the NED, although takes of leatherbacks are more scattered throughout the longline fishery than are loggerheads, with substantial numbers taken not just in the northern statistical sampling areas (mid-Atlantic Bight and Northeast Coastal as well as Northeast Distant (*i.e.* Grand Banks), but also in the other areas the fishery is prosecuted, including the Gulf of Mexico.

The population dynamics, abundance, and pelagic distribution of leatherbacks are even less understood than those of the other sea turtle species, and the effects of losses attributable to HMS fisheries, as for loggerheads, may depend on the stock origins of the leatherbacks captured by these fisheries.

The incidental take of leatherbacks by the pelagic longline fishery is relatively high. From 1992-98, the pelagic longline fishery captured/entangled/hooked an estimated 5,003 leatherbacks, of which an estimated 39 were moribund or dead prior to release. An additional 1,412 leatherbacks per year are assumed to have been seriously injured and died following release (based on a 29% mortality rate, per Aguilar *et al.* (1995)). These estimates, based on data collected by observers and as recently revised for 1992-1998 (Table 3), indicate that the number of leatherback entanglement/hooking and related takes have been nearly twice the level assumed in previous biological opinions. In particular, the 1999 observed takes (grossly adjusted for a 5% target sampling level) indicate that an additional 32 leatherbacks per year may have died after being hooked on pelagic longline gear. The proposed amendment to the HMS FMP is estimated to further increase the number of leatherbacks injured in this fishery by 7.01%, and the number of dead leatherbacks by 8.07%, for a total of 27 additional animals.

Based on past fishery performance over 1992 - 1998, NMFS estimates that, on average, 715 leatherback turtles may be incidentally hooked by the pelagic longline fishery each year, of which an average of 12 will actually be observed as moribund or dead on release. Since the expectation that these turtles will die as a result of their hooking is 29%, an additional 195 leatherbacks are estimated to be killed each year by the pelagic longline fishery.

Leatherbacks are also expected to be captured and injured by other HMS fisheries but at much lower levels. Based on past observed fishing activities in the shark gillnet fishery, which operates off the southeastern U.S., an additional two leatherbacks per year are expected to be seriously injured or die following capture or entanglement in this fishery. However, this is probably an underestimate, given that this component of the HMS FMP has not had consistent, adequate observer coverage. Likewise, the bottom longline fishery for sharks can be expected to capture/entangle/hook and seriously injure or kill an additional two leatherbacks each year. The anticipated incidental take of the HMS fisheries combined, if no additional measures to reduce take are implemented, is 747 leatherbacks, 215 of which are likely to be seriously injured and die. Over a twenty year time period, 14,940 individual turtles may be captured/entangled/hooked, and 4,300 of these turtles can be expected to die.

Since information is not available regarding the origin of leatherbacks taken in HMS fisheries, NMFS assumes that the majority of the 215 turtles anticipated to be seriously injured and die each year originate from the western Atlantic nesting populations. The removal of these large numbers of leatherbacks from the population are in excess of the 1% levels considered sustainable by Spotila *et al.* (1996), and therefore may cause an appreciable negative effect on the numbers, distribution, and reproduction of leatherbacks in the wild.

As noted above, small numbers of turtle takes have been recorded in other HMS fisheries and the potential for leatherback takes in these fisheries exists. To date, only 2 have been recorded taken in the bottom longline fishery for sharks, and these were released live. However, as noted above, observed effort in this fishery represented approximately 2 - 5 % of total landings, so this could represent between 40 and 100 leatherbacks over a 3-year period (or 13 - 34 annually), if direct scaling of these numbers were appropriate. Again, it is important to quantify effort in this fishery in order to better determine the level of effects this fishery may have on sea turtle populations.

No leatherback turtle takes have been recorded in the tuna purse seine fishery, the harpoon fishery or other hand gear fisheries. Rod-and-reel fisheries, in general, rarely interact with leatherbacks, and no such interactions have specifically been documented in HMS fisheries.

Effects on Other Sea Turtles

Because it is considered that takes of turtles other than leatherbacks or loggerheads in the pelagic longline fishery are likely mis-identifications (Witzell 1999; Witzell in prep.), it is difficult to assess the effects of this fishery on other sea turtle species. While some takes of other species may occur, such instances are probably rare, and not in excess of numbers previously considered under past biological opinions for the pelagic longline fishery.

Kemp's ridley, green, or hawksbill turtles have not been documented as taken in any other HMS fisheries. These species have been documented as interacting with rod-and-reel fisheries in general, but not specifically with such fisheries for which HMS species were targeted. Take of these species is less likely than for loggerheads and leatherbacks, due to their less pelagic distribution.

Right Whale Critical Habitat

Actions that may adversely affect the value of designated critical habitat for the northern right whale are evaluated separately in Biological Opinions, regardless of whether right whales are present within the critical habitat when the adverse effects occur. The proposed HMS fisheries may diminish the value of the critical habitat that has been designated for the northern right whale in two ways: (a) the distribution and relative abundance of gear associated with the proposed fisheries may diminish the value of critical habitat by increasing the risk of entanglements and mortalities and (b) the fishery may diminish the value of designated critical habitat by reducing the availability of right whale prey within critical habitat. However, as right whales feed primarily on copepods, this is highly unlikely.

The areas designated as critical habitat for right whales in the northeast (including portions of Cape Cod Bay, Stellwagen Bank and the Great South Channel) are not currently frequented by participants in HMS fisheries. As discussed above, the Atlantic Offshore Take Reduction Team recommended closure of right whale critical habitat areas to pelagic driftnet and longline gear, to prevent future expansion of effort into these currently unfished areas. HMS has partially addressed this recommendation by prohibiting pelagic driftnet as an allowable gear-type in swordfish and tuna fisheries. As noted above, a closure of the area to longline gear is to be implemented by a separate rule under the MMPA. Because there is currently little to no overlap between right whales and HMS fisheries in these northeast critical habitat areas, no affect is expected.

The area designated as critical habitat for right whales in the southeast overlaps with the area in which the Southeast U.S. shark gillnet fishery is prosecuted. Concern regarding increased risk of entanglement and mortality was addressed in the HMS FMP, minimizing the likelihood that the fishery will appreciably diminish the value of designated critical habitat for both the survival and recovery of the northern right whale, by implementing the shark fishery time area closure and the 100% observer requirement of the May 27, 1997 Biological Opinion. This assumes that the risk of the fishery co-occurring with right whales is greatly diminished, and that the presence of observers (when and where the fishery is allowed to operate) will both help to avoid an entanglement, as well as ensure that disentanglement experts are contacted immediately in the unlikely event that any right whales are entangled. However, this requirement was not fully implemented in 1999. Monitoring compliance with the closure provision via VMS and, other than lower-level observer coverage for monitoring purposes, requiring observers only on those vessels electing to fish with strike nets in the closure area would still ensure that the primary calving area is free of shark gillnet gear except when used in strike fashion using spotter planes and in the presence of observers who would still be able to ensure disentanglement experts would be contacted in the unlikely event of an entanglement. No fishers so far have elected to fish in the closed area with the strike (*i.e.* run around gillnet) method.

The proposed longline closures off the southeastern US encompass the southeastern right whale critical habitat and surrounding areas where right whales have been sighted during the winter calving season; therefore, this action will further lessen the potential for entanglement risk of longline gear to right whales or overwintering humpbacks.

Since the availability of right whale prey is not a concern in the southeast, as right whales do not feed extensively while on the southern end of their migratory cycle, the HMS fisheries are not expected to appreciably diminish the value of designated critical habitat by reducing the availability of right whale prey within critical habitat.

VI. Cumulative Effects

Cumulative Effects include the effects of future State, Tribal, local, or private actions that are reasonably expected to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Cumulative impacts from unrelated, non-Federal actions occurring in the northwest Atlantic may affect sea turtles, marine mammals, and their habitats. Stranding data indicate marine mammals and sea turtles in Atlantic waters die of various natural causes, including cold stunning (in the case of sea turtles), as well as human activities, such as incidental capture in state fisheries, ingestion of or entanglement in debris, vessel strikes, and degradation of nesting habitat. The cause of death of most marine mammals and turtles recovered by the stranding network is unknown. In waters of many Atlantic states, state-permitted coastal gillnetting may affect listed sea turtles and marine mammals. Recreational hook-and-line fisheries have been known to lethally take sea turtles, including Kemp's ridleys.

Fishing activities in state waters take several protected species. However, it is not clear to what extent state-water fisheries may affect listed species differently than the same fisheries operating in Federal waters. Further discussion on state water fisheries is contained in the Environmental Baseline section.

Wiley *et al*. (1995) showed that in the mid-Atlantic area (between Chesapeake Bay, Virginia, and Cape Hatteras, North Carolina) of the stranded humpback whales for which the cause of death was determinable, 30% of the mortalities were attributed to vessel strikes and 25% had injuries consistent with entanglement in fishing gear. This indicates that vessel interactions are having an impact upon whale populations along this portion of the coast, as well as in right whale concentration areas. Because most of the whales involved in these interactions are juveniles, areas of concentration for young or newborn animals are particularly important to protect. This also raises concerns that, with such mortality focused on one age-class of the population, that future recruitment to the breeding population may be affected.

Ship strikes have been identified as a significant source of mortality to the Western Atlantic stock of right whales (Kraus 1990) and are also known to impact all other endangered whales. Specifically, commercial and private vessels may affect humpback, fin, sperm and right whales. Small vessel traffic also kills or injures threatened and endangered sea turtles in the action area.

The ports of Jacksonville and Port Everglades, Florida; Baltimore, Maryland; Wilmington, Delaware; Philadelphia, Pennsylvania; New York, New York; and Boston, Massachusetts support some of the country's strongest maritime economies. Commercial shipping traffic in Massachusetts Bay is estimated at 1,200 ship crossings per year with an average of three per day. About 17 million tons of waterborne cargo pass through the Port of Jacksonville, Florida which receives about 1,600 vessels each year moving between the U.S. and South America, Europe, and the Caribbean. About 4.8 million tons (short tons) pass through the Port of Wilmington, Delaware which receives about 400 vessels each year. About 56 million tons of waterborne cargo passed through the Port of New York in 1998. About 1.3 million tons of general cargo, 1.5 million tons of bulk cargo, and 12.8 million tons of bulk fuel cargo pass through the Port of Boston, Massachusetts, which receives more than 62 ship calls, 350 container vessels, and 1,700 bulk cargo vessels each year. In addition, about 60 cruise vessels sail from the Port of Boston each year[2].

In southeastern waters, shipping channels associated with Jacksonville and Port Everglades, Florida, bisect the area that contains the most concentrated whale sightings within right whale critical habitat. These channels and their approaches serve three commercial shipping ports and two military bases. All of these channels require periodic maintenance dredging by the Corps of Engineers (and at times, more extensive dredging is conducted to support port expansion or to allow for larger military vessels). These commercial ports are growing, with the port of Jacksonville, one of the busiest ports on the east coast, undergoing major expansion along with several other east coast ports vying for designation as "mega ports" to attract Panamanian ex-vessel traffic. Expansion of these ports may require section 7 consultations.

In Massachusetts Bay alone, about 20 whale watch companies representing 40-50 boats conduct several thousand trips from April to September, with the majority of effort in the summer season. More than 280 commercial vessels fish on Stellwagen Bank. Sportfishing contributes more than 20 vessels per day from May to September. In addition, an unknown number of private recreational boaters frequent Massachusetts and Cape Cod Bays.

It is possible that the combination of these activities may cause sublethal effects to protected species that could prevent or slow a species' recovery; such effects are currently unknown. Various initiatives have been planned or undertaken to expand or establish high-speed watercraft service in the northwest Atlantic, including one service between Bar Harbor, Maine, and Nova Scotia with a vessel operating at higher speeds than established watercraft service. The Bar Harbor–Nova Scotia high speed ferry conducted its first season of operations in 1998. The operations of these vessels and other high-speed craft may adversely affect threatened and endangered whales and sea turtles, as discussed previously with private and commercial vessel traffic in the Action Area. NMFS and other member agencies of the Northeast Implementation Team for the Recovery of the Northern Right Whale will continue to monitor the development of the high speed vessel industry and its potential threats to listed species and critical habitat. Recent whale strikes resulting from interaction with whale watch boats and recreational vessels have also been recorded.

NMFS expects this commercial traffic into and out of these ports to continue into the foreseeable future. The best scientific and commercial data available provide no specific information on what risk this level of commercial traffic poses to endangered whales in the action area, but we would expect this level of commercial traffic to pose a risk of ship strikes that would continue to kill or seriously injure whales in

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[2] These data were derived from the internet websites for each of the ports named

numbers similar to those observed between 1994 and 1999 (1 dead blue whale, 1 dead sei whale, 2 dead fin whales at least six dead right whales).

In most areas of the United States, annual dredging to accommodate commercial shipping occurs in the nearshore approaches to most of the major ports. Dredging may pose a threat to whales due to increased vessel traffic. This entails movement back and forth between dredging and dumping sites (although these vessels in general are relatively slow moving and, under ESA section 7 consultations conducted on various dredging activities, various measures to mitigate this concern have been implemented, including posting of dedicated whale observers in high whale-use areas and seasons). Additionally, dredging may result in increased vessel traffic as deepening and/or widening of ports or channels attracts more and larger vessels to use these areas. Dredging is responsible for injury and mortality of sea turtles and is also mitigated for in many ways under various Biological Opinions conducted on these activities.

Sources of pollutants in Atlantic and Gulf coastal regions include atmospheric loading of pollutants such as PCBs, storm water runoff from coastal towns, cities and villages, runoff into rivers emptying into the bays, groundwater discharges and river input and runoff. Nutrient loading from land based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effects to larger embayments is unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo *et al*. 1986), the impacts of many other anthropogenic toxins have not been investigated.

In feeding areas of the northeast such as the Massachusetts Bay area, the dominant circulation patterns make it probable that pollutant inputs into Massachusetts Bay will affect Cape Cod Bay's right whale critical habitat. Disposal operations at the Massachusetts Bay Disposal Site (MBDS) are currently being monitored for ecosystem effects and another site in Cape Cod Bay is in the preliminary stages of section 7 consultation for designation as a disposal site. Barrels at the historic Industrial Waste Site containing low level radioactive waste, located two nautical miles west of the Massachusetts Bay Disposal Site, may affect water quality. Impacts of barrel seepage or release of chemicals due to severe weather conditions or impacts by fishing gear are not quantified.

The Massachusetts Water Resources Authority will be conducting an extensive monitoring program of their proposed outfall to evaluate the future contribution of that source to ecological effects on Cape Cod and Massachusetts Bays. Nutrient loadings from Cape Cod and Plymouth communities stimulate nearshore spring blooms similar to those observed near Boston Harbor.

Geraci *et al*. (1989) identified bioaccumulation of the neurotoxin responsible for paralytic shellfish poisoning (saxitoxin) in mackerel consumed by humpback whales as the possible cause of mortality of 14 humpbacks which stranded between November of 1987 and January of 1988. No saxitoxin was identified in plankton or shellfish sampled in Massachusetts waters at the time of the mortality. The authors suggest the neurotoxin could have been transported by mackerel obtaining the toxin from planktonic sources in the Gulf of St. Lawrence, the spawning ground for mackerel. While a similar multiple mortality of large whales has not been observed, the authors suggest individual mortalities caused by the biotoxin would go unnoticed. The reason for the multiple mortalities in the winter of 1987 and 1988 has not been explained, although they may have been related to a shift in the normal diet of humpbacks due to the lack of sand lance in the bays the previous summer.

Other contributors of pollutants in the Massachusetts and Cape Cod Bays include atmospheric loading of pollutants such as PCBs, storm water runoff from Massachusetts coastal towns, cities and villages, runoff into rivers emptying into the bays, groundwater discharges and river input and runoff from Gulf of Maine waters.

Generally, right whales and humpback whales do not use southeastern waters for feeding. Therefore, most of the effects from pollution would be expected in the northern summer feeding areas for these species. However, sea turtles nest primarily in the southeastern United States, and early life stages and breeding individuals of these species are likely to be impacted by pollution in these areas, as well as in the northeast. Necropsies of hatchlings and juveniles show that young turtles commonly consume plastics and tar balls (STSSN stranding data base).

Humpback whale entanglements occur in relatively high numbers in Canadian waters. Reports of collisions with fixed fishing gear set for groundfish around Newfoundland averaged 365 annually from 1979 to 1987 (range 174-813). An average of 50 humpback whale entanglements (range 26-66) were reported annually between 1979 and 1988 and 12 of 66 humpback whales that were entangled in 1988 died (Lien *et al*., 1988). Right whale entanglements also occur in Canadian waters, although not as frequently as for humpback whales. Many entanglements observed in U.S. waters may have originated in Canadian waters. Unless gear is specifically marked and such marks are documented, it is often impossible to determine the origin of the gear.

For sea turtles, substantial impacts of human activities are still evident on nesting populations of all species, particularly those areas outside of U.S. control. This includes poaching of eggs from nests and using the turtles themselves for food or shell products.

Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. At the St. Lucie nuclear power plant at Hutchinson Island, Florida, large numbers of green and loggerhead turtles have been captured in the seawater intake canal in the past several years. Annual capture levels from 1994 - 1997 have ranged from almost 200 to almost 700 green turtles and from about 150 to over 350 loggerheads. Almost all of the turtles are caught and released alive; NMFS estimates the survival rate at 98.5% or greater (1997e). Other power plants in south Florida, west Florida, and North Carolina have also reported low levels of sea turtle entrainment. A biological opinion completed in January 2000 estimates that the operations at the Brunswick Steam Electric Plant in Brunswick, North Carolina, may take 50 sea turtles in any combination annually, that are released alive. NMFS also estimated the total lethal take of turtles at this plant may reach 6 loggerhead, 2 Kemp's ridley or 3 green turtles annually. A biological opinion completed in June 1999 on the operations at the Crystal River Energy Complex in Crystal River, Florida, estimated the level of take of sea turtles in the plant's intake canal may reach 55 sea turtles with an estimated 50 being released alive biennially.

Oil spills from tankers transporting foreign oil, as well as the illegal discharge of oil and tar from vessels discharging bilge water will continue to affect water quality in the Gulf of Mexico. Cumulatively, these sources and natural oil seepage contribute most of the oil discharged into the Gulf of Mexico. Floating tar sampled during the 1970s, when bilge discharge was still legal, concluded that up to 60% of the pelagic tars sampled did not originate from the northern Gulf of Mexico coast.

Marine debris will likely persist in the action area in spite of MARPOL prohibitions. In Texas and Florida, approximately half of the stranded turtles examined have ingested marine debris (Plotkin and Amos 1990 and Bolten and Bjorndal 1991). Of 43 dead stranded green turtles examined by Bjorndal *et al.* (1994), 24 had ingested some sort of debris. Although fewer individuals are affected, entanglement in marine debris may contribute more frequently to the death of sea turtles.

Coastal runoff and river discharges carry large volumes of petrochemical and other contaminants from agricultural activities, cities and industries into the Gulf of Mexico. The coastal waters of the Gulf of Mexico have more sites with high contaminant concentrations than other areas of the coastal United States, due to the large number of waste discharge point sources. Although these contaminant concentrations do not likely affect the more pelagic waters of the action area, the species of turtles analyzed in this biological opinion travel between nearshore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles.

An extensive review of environmental contaminants in turtles has been conducted by Meyers-Schöne and Walton (1994); however, most information relates to freshwater species. High concentrations of chlorobiphenyls and organochlorine pesticides in the eggs of the freshwater snapping turtle, *Chelydra serpentina*, have been correlated with population effects such as decreased hatching success, increased hatchling deformities and disorientation (Bishop *et al.* 1991, 1994).

Very little is known about baseline levels and physiological effects of environmental contaminants on marine turtle populations (Witkowski and Frazier 1982, Bishop *et al.* 1991). There are a few isolated studies on organic contaminants and trace metal accumulation in green and leatherback sea turtles (Davenport and Wrench 1990, Aguirre *et al.* 1994). Mckenzie *et al.* (1999) measured concentrations of chlorobiphenyls and organochlorine pesticides in marine turtles tissues collected from the Mediterranean (Cyprus, Greece) and European Atlantic waters (Scotland) between 1994 and 1996. Omnivorous loggerhead turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles. It is thought that dietary preferences were likely to be the main differentiating factor among species. Decreasing lipid contaminant burdens with turtle size were observed in green turtles, most likely attributable to a change in diet with age. Sakai *et al.* (1995) found the presence of metal residues occurring in loggerhead turtle organs and eggs. More recently, Storelli *et al.* (1998) analyzed tissues from twelve loggerhead sea turtles stranded along the Adriatic Sea (Italy) and found that characteristically, mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals and porpoises by Law *et al.* (1991). Research is needed on the short- and long-term health and fecundity effects of chlorobiphenyl, organochlorine, and heavy metal accumulation in sea turtles.

Beachfront development, lighting and beach erosion control all are ongoing activities along the Gulf and Atlantic coasts. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nocturnal human activities along nesting beaches may also discourage sea turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. However, more and more coastal counties are adopting more stringent protective measures to protect hatchling sea turtles from the disorienting effects of beach lighting. Some of these measures are being drafted in response to ongoing lawsuits brought against the counties by concerned citizens who charged the counties with failing to uphold the ESA by allowing unregulated beach lighting which resulted in takes of hatchlings.

The combination of all these activities may cause effects to protected species that could prevent or slow a species' recovery. Designation of critical habitat, proactive approaches by other Federal agencies (i.e. the Army Corps of Engineers has limited dredging in southeastern channels to periods when turtles are not concentrated in the channels), participation by state, federal agencies, and the private sector in recovery plan implementation activities, and the section 7 process all contribute to mitigating these potential cumulative effects.

VII. Integration and Synthesis of Effects

This section provides an integration and synthesis of the information presented in the *Status of the Species, Environmental Baseline, Cumulative Effects*, and *Effects of the Action* sections of this Opinion. The intent of the following discussion is to provide a basis for determining the additive effects of continuing fisheries covered by the Highly Migratory Species Fishery Management Plan on loggerhead, leatherback, green, Kemp’s ridley, and hawksbill sea turtles, in light of their present and anticipated future status in the Gulf of Mexico, Caribbean and Atlantic Ocean.

The *Status of the Species* discussion describes how all listed sea turtle populations affected by the proposed action have been adversely affected by human-induced factors such as commercial fisheries, direct harvest of turtles, and modification or degradation of the turtle’s terrestrial and aquatic habitat. Effects occurring in terrestrial habitats have generally resulted in the loss of eggs or hatchling turtles, or nesting females, while those occurring in aquatic habitat have caused the mortality of juvenile, subadult and adult sea turtles through entanglement in fishing gear, ingestion of debris or pollution. While the loss of all these turtles, including eggs, has likely adversely affected the ability of all sea turtle populations considered in this Opinion to maintain or increase their numbers by limiting the number of individuals in these populations, the loss of females of course also results in reductions in future reproductive output.

Species with delayed maturity such as sea turtles are demographically vulnerable to increases in mortality, particularly of juveniles and subadults, those stages with higher reproductive value. As discussed in the Status of the Species, the age of sexual maturity of most species of sea turtles is currently unknown, although the sexual maturity of loggerhead sea turtles may be as high as 35 years, and green turtles may not reach maturity until 30-60 years. The potential for an egg to develop into a hatchling, into a juvenile, and finally into a sexually mature adult sea turtle varies among species, populations, and the degree of threats faced during each life stage. It is reasonable to assume that females killed prior to their first successful nesting will have contributed nothing to the overall maintenance or improvement of the species' status, while females killed after their first successful nesting may have produced some juvenile turtles that survive to sexual maturity. Based on information provided in the Status of the Species, it is currently unknown how past and present mortalities of individual sea turtles due to a variety of natural and human-induced factors have affected the ability of individual sea turtles to replace themselves, thereby maintaining population numbers. Given the continuing declines observed for most populations of listed sea turtle species in the Atlantic Ocean, NMFS assumes that it is likely that several individuals of the sea turtle population considered in this Opinion are not currently able to replace themselves.

Although a long-term, qualitative analysis of the anticipated effects to sea turtles due to the proposed implementation of the final rule is complicated by a lack of information regarding the age-specific survivorship and age-specific fecundity of each of the sea turtle species considered in this Opinion, certain assumptions can be made using limited information from sea turtles in general and basic concepts of conservation biology. For example, an understanding of loggerhead sea turtle demography has been developed which provides a fundamental understanding of the relative reproductive values of various life history stages (Crouse 1987, 1999; NRC 1990), which can be broadly extended to other sea turtles. As described in the Status of the Species discussion, sea turtles face numerous natural and human-induced factors in both the marine and terrestrial phases of their life cycles. While the most vulnerable stages may be the early ones, the reproductive value of a turtle egg or hatchling is relatively low and the sensitivity of population growth to a loss of an egg or hatchling also is low. This high mortality at early life stages has led to strong evolutionary pressures selecting for a high adult survival of sea turtles and a resulting ability for repeated reproduction. As a result sea turtle populations under normal conditions are better adapted to withstanding losses at early life stages than their subadult and adult phases. Environmental factors which cause injury or mortality to individual juvenile, subadult, or adult sea turtles are more likely to have longer term, adverse effects on sea turtles at a population level than loss of eggs or hatchlings. At a much more basic level, if mortality rates continue to exceed recruitment rates, populations will continue to decline.

Of all the known factors identified in NMFS' decision to list sea turtles as threatened or endangered, Status of the Species, and the current Environmental Baseline and anticipated Cumulative Effects described in this Opinion, by far the most significant sources of injury or mortality of juvenile, subadult, and adult sea turtles are those associated with commercial fishing. Assuming observations of loggerhead demographics apply broadly to all sea turtles, these factors are acting on the life stages with the greatest reproductive value for the survival and recovery of sea turtle populations, large juveniles and subadults. The reproductive value of a mature sea turtle can be assumed to remain high for several years under normal conditions. Based on this, we can conclude that the population growth of sea turtles is most sensitive to changes in the survivorship of juveniles and subadults, and continued reductions in individuals from these life stages may have longer term effects than losses due to other factors affecting eggs or hatchlings.

Other fishing operations, such as lost fishing gear and marine debris, are also known to injure or kill sea turtles in the Gulf of Mexico, Caribbean and Atlantic Ocean, but these factors, and others discussed in the environmental baseline section such as dredging, entrainment in power plant intakes, collisions with boats, natural disease and parasites are not well quantified and affect sea turtles at all life stages. Likewise, although natural predation on turtles in all life stages, parasitism, disease, oceanic regime shifts, inclement weather, beach erosion and accretion, thermal stress, and high tides will continue to exert adverse pressures on sea turtle populations, especially on nesting beaches, the long term effects of these ongoing factors to the future status of sea turtles are uncertain.

To evaluate fully the comparative significance of these different sources of mortality, better information is needed on age at reproductive maturity, age-specific survivorship, age-specific fecundity, and their variances. In addition, data on age structure and sex composition of sea turtles taken incidentally to Highly Migratory Species fisheries, and many other fisheries in the Gulf of Mexico and Atlantic are limited, there is generally little information on survival rate of various age classes of turtles, and the population structure of sea turtles on the fishing grounds is uncertain. Absent this information, NMFS assumes that the status of loggerheads and leatherback sea turtles in the Gulf of Mexico and Atlantic will continue to decline, and sources of injury and mortality of sea turtles described in the Environmental Baseline will continue at current levels.

Information is available to allow estimates of past and ongoing levels of capture and release, injury, and mortality of sea turtles in various fisheries described in the Environmental Baseline (Table 1), and from these, future estimates of capture and mortality can be extrapolated. Based on these estimates and a general understanding of the demographics of sea turtles, further assumptions can be made regarding both past and future effects of different activities on sea turtles. For example, prior to 1992, both loggerhead and leatherback sea turtles were seriously affected by directed harvest on nesting beaches, and incidental capture in both nearshore and high seas driftnets (Eckert 1993; Spotila *et al*.; Crouse 1999). Looking at these data, it could reasonably be assumed that long-term demographic effects of these losses are still evident in loggerhead and leatherback populations in the Gulf of Mexico, Caribbean and Atlantic, and given current observations of continued declines, a reasonable assumption could also be made that the long term survival of leatherback and loggerhead sea turtle populations in these areas is uncertain. Additional sources of injury or mortality to these species could have questionable effects on their long-term survival. However, population growth rates are far more sensitive to changes in annual survival rates of juveniles and adults (Crouse *et al.* 1987, 1994 and Heppell *et al.* in prep.) and reliable estimates of other factors such as nesting success are unavailable.

Despite these limitations, NMFS believes a reasonable, qualitative analysis of the proposed continuation of the Highly Migratory Species fisheries in the Gulf of Mexico and Atlantic is possible and that an appropriate horizon to forecast expectations of the fishery's response to the interim final rule is twenty years. Given potential changes in the environment and composition of fisheries, extending this analysis beyond twenty years would be entirely speculative. Based on the information provided earlier in this Opinion, NMFS has assumed that effects associated with the hooking and release of sea turtles may result in significant rates of mortality. The turtles not seriously injured, but hooked and trailing line, will experience short- or long-term interruptions of normal feeding and migratory behaviors and may suffer additional injury or mortality as a consequence of the trailing line. It is unlikely that these sea turtles survive and reproduce at the same rate as unaffected turtles, although they may eventually recover from the hooking encounter.

The following discussion describes the anticipated effects to each of the affected sea turtle species from operations of the Highly Migratory Species FMP, and the proposed regulatory amendment, assuming unaltered fishing methods, in conjunction with other fishery and non-fishery sources of impact and mortality described earlier in the environmental baseline and cumulative effects sections.

Effects on Loggerhead Sea Turtles

Over the next twenty years, loggerhead sea turtles will continue to be captured, entangled, or hooked by fisheries other than the Highly Migratory Species fisheries considered in this Opinion. Additional injuries and mortalities will continue to be incurred by foreign longline fleets as well as other fisheries which are not currently observed. Sea turtle capture and mortality rates in these other fisheries are generally unknown, but Aguilar *et al.* (1995) estimated that as many as 20,000 juvenile loggerheads were taken annually in the Spanish longline fleet, and that up to 10,700 of these died annually. An unknown number of loggerheads may also be injured or killed from non-fishery related effects such as direct harvest, vessel collisions, or entanglement or ingestion of debris. Adverse effects to sea turtle habitat, including loss of nesting sites or degradation of nesting or foraging areas are also expected to continue. Since quantitative data on the extent of these impacts to loggerhead turtle populations are lacking, a reliable cumulative assessment of these effects is not possible.

Based on information provided in the Effects of the Action section of this Opinion, NMFS has estimated that continuation of the Highly Migratory Species fisheries, as proposed, will capture/entangle up to 1,050 loggerhead sea turtles annually in the Gulf of Mexico, Caribbean and Atlantic over the next twenty years, in addition to those estimated to occur in other fisheries. Of these captures, NMFS estimates that up to 306 loggerhead sea turtle may be killed annually. Based on the current status of the loggerhead population in the Atlantic, Caribbean and Gulf of Mexico, the declining status of the northern subpopulation of loggerheads, the anticipated continuation of current levels of injury and mortality described in the environmental baseline and cumulative effects section of this Opinion, NMFS believes that the anticipated additional mortality of 6,120 loggerhead over the next 20 years, from activities associated with the proposed continuation of the U.S. Highly Migratory Species fishery in the U.S. Atlantic EEZ, would reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of loggerhead populations in the wild by reducing the numbers, distribution, or reproduction of the species.

Effects on Leatherback Sea Turtles

Over the next twenty years, leatherback sea turtles will continue to be captured, entangled, or hooked by fisheries other than the Highly Migratory Species fisheries, including foreign longline fleets and other fisheries which are currently not observed. In addition, an unknown number of leatherbacks may be injured or killed from non-fishery related effects such as direct harvest, vessel collisions, or ingestion of debris. Adverse effects to sea turtle habitat, including loss of nesting sites or degradation of nesting or foraging areas are also expected to continue. Quantitative data on the extent of these effects to leatherback turtle populations are lacking; however, it is reasonable to assume if current levels of mortality are exceeding recruitment, the population will continue to decline and the long-term survival and recovery of this species may be questionable.

This Opinion has estimated that continuation of the Highly Migratory fisheries, as proposed, may result in the capture/entanglement/hooking of an additional 14,940 leatherbacks in the Gulf of Mexico, Caribbean and Atlantic over the next twenty years. Of these 14,940 captured leatherbacks, 4,787 may be killed over 20 years. NMFS believes that approximately 29% of the 14,300 leatherback sea turtles estimated to be captured, hooked, and released from the pelagic longline over the next twenty years will die. Spotila *et al.,* (1996) have estimated the western Atlantic population of leatherbacks at 15,000 and the Caribbean population at 4,000 individuals. Based on the preceding evaluation of the status of leatherback sea turtles and the anticipated continuation of current levels of injury and mortality described in the environmental baseline and cumulative effects section of this Opinion, NMFS believes the anticipated additional mortality of 4,787 leatherback sea turtles over the next 20 years associated with the proposed action, would reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of leatherback populations in the wild by reducing the numbers, distribution, or reproduction of the species.

VII. Conclusion

After reviewing the current status of the northern right whale, the humpback, fin and sperm whales, and leatherback, loggerhead, green, hawksbill, and Kemp's ridley sea turtles, the environmental baseline for the action area, the effects of implementation of the proposed regulatory Amendment to the Atlantic HMS FMP, the record of compliance with requirements of previous BOs on HMS fisheries, and probable cumulative effects, it is NMFS' biological opinion that:

(1) continued operation of the Atlantic pelagic longline fishery is likely to jeopardize the continued existence of the leatherback sea turtle and loggerhead sea turtles; and

(2) continued operation of the Atlantic pelagic longline fishery may adversely affect, but is not likely to jeopardize the continued existence of the right whale, humpback whale, fin whale, sperm whale, or Kemp's ridley, green, or hawksbill sea turtle; and

(3) continued operation of the Atlantic gillnet fishery for sharks, may adversely affect but is not likely to jeopardize the continued existence of the right whale, humpback, fin, or sperm whales, or Kemp's ridley, green, loggerhead, hawksbill or leatherback sea turtles; and

(4) continued operation of the Atlantic bottom longline fishery, the purse seine fishery, and the harpoon, hand gear, rod and reel, etc. fisheries may adversely affect, but is not likely to jeopardize the continued existence of the right whale, humpback whale, fin whale, sperm whale, or leatherback, Kemp's ridley, green, hawksbill, or loggerhead sea turtles; and

(5) components of the Atlantic HMS fisheries is not likely to destroy or adversely modify critical habitat designated for the right whale.

VIII. Reasonable and Prudent Alternatives

Regulations (50 CFR §402.02) implementing section 7 of the NMFS define reasonable and prudent alternatives as alternative actions, identified during formal consultation, that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; (3) are economically and technologically feasible; and (4) would, NMFS believes, avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

This opinion has concluded that the Atlantic Pelagic Longline Fisheries for Swordfish, Tuna, Shark and Billfish in the U.S. Atlantic, as proposed, are likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. The clause "jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (CFR §402.02).

Principles for reasonable and prudent alternatives

As discussed in the preceding biological opinion, HMS fisheries in the U.S. Atlantic threaten loggerhead and leatherback sea turtles primarily by capturing them in differing types of gear, injuring turtles caught in fishing gear, harming turtles that manage to escape by leaving gear trailing from their mouths or body parts, drowning turtles that are caught in gear, or some combination of these effects. Ideally, the most effective solutions to these threats would result from a careful examination of interactions between gear and sea turtles in *all* of the federally-managed fisheries in the Atlantic and develop alternatives that reduce or eliminate those interactions in all of those fisheries. However, because of time constraints, the current alternatives will focus on changes that can be made to the Atlantic HMS fisheries.

To avoid the likelihood of jeopardizing the continued existence of loggerhead and leatherback sea turtles, fishery management measures must reduce (a) the number of both loggerhead sea turtles that are incidentally captured, injured, or killed by gear associated Highly Migratory Species fisheries in the United States Atlantic by at least 75 percent from current levels and (b) the number of leatherback sea turtles that are incidentally captured, injured, or killed by gear associated Highly Migratory Species fisheries in the United States Atlantic by at least 75 percent from current levels (that is, a reduction in the number of *both* species of sea turtles captured, injured, or killed compared with a five-year running average of the number captured, injured, or killed annually).

This reduction must be demonstrated by data derived from these fisheries by September 2001 (because three quarters of the year 2000 will have passed prior to implementation of take reduction measures, and due to the time-lag between the collection of data (which, in the case of the pelagic longline fishery is based on logbook data to determine effort, and 1999 logbooks are still being received to date), and the completion of data analyses, it likely will only be possible to measure any change in incidental take levels for the fourth quarter of 2000 by this date. Therefore, it will only be expected that one quarter of the annual target reduction in take will have been demonstrated by this date.

This reduction in the incidental capture, injury, and death of loggerhead sea turtles should be proportional to the threat the gear poses to loggerhead sea turtles. Therefore, pelagic longline gear should be modified — or the method by which this gear is deployed should be modified — to achieve the greatest reduction in number of loggerhead and leatherback sea turtles that are incidentally captured, injured, or killed by this gear. Trawls, gill nets, bottom longline and hook-and-line gear should be modified — or the method by which this gear is deployed should be modified — to achieve the next highest reduction in the number of loggerhead and leatherback sea turtles that are incidentally captured, injured, or killed in that gear. Purse-seines and strike nets should be modified — or the method by which this gear is deployed should be modified — to achieve lesser reductions in the number of loggerhead and leatherback sea turtles that are incidentally captured, injured, or killed in that gear.

These reductions in number of loggerhead and leatherback sea turtles that are incidentally captured, injured, or killed in gear can be accomplished directly by gear modifications or indirectly by changing the method by which gear is deployed. Indirect modifications can include (a) managing fisheries that use harmful gear over time and space to eliminate the likelihood of interactions between loggerhead and leatherback sea turtles and gear (proportional to the threat posed by specific gear); (b) managing fisheries to eliminate the likelihood that loggerhead and leatherback sea turtles captured by gear would drown before they can be released (such as keeping soak times to less than 30 to 45 minutes); (c) excluding gear from areas that, based on available data, appear to be important for loggerhead and leatherback sea turtles; or any combination of these changes such that the number of loggerhead and leatherback sea turtles that are incidentally captured, injured, and killed by gear associated with HMS fisheries in the United States Atlantic is reduced by at least 75 percent from current levels.

NMFS can reduce the number of loggerhead and leatherbacks sea turtles that are incidentally captured, injured, or killed by gear associated with HMS fisheries in the United States Atlantic by at least 75 percent from current levels in a number of ways. However, NMFS must implement these management measures by September 30, 2000. It must also demonstrate that the management measures it has implemented have achieved this reduction by September 2002, with interim evaluations (based on actual, observed takes) by March 1, 2001; September 1, 2001; and March 1, 2002.

Reasonable and Prudent Alternatives

If NMFS cannot develop and implement management measures to reduce the number of loggerhead and leatherback sea turtles that are incidentally captured, injured, and killed by gear associated with HMS fisheries in the United States Atlantic by at least 75 percent from current levels, NMFS must implement the following reasonable and prudent alternatives, each of which have sub-elements:

Alternative 1

a. Exclusion Zones

By the effective date of the final rule amending the FMP, NMFS must implement regulations to close the Grand Banks area (i.e. NED statistical sampling area) to pelagic longline fishing from July through December to reduce potential interactions between longline gear and loggerhead and leatherback sea turtles in this area. This is an addition to NMFS proposal (as part of the proposed action) to close the

Florida Atlantic to longline fishing throughout the year, close the "Charleston Bump" area from February - April, close the DeSoto Canyon area of the Gulf of Mexico to longline fishing year-round; and prohibit the use of live bait for pelagic longline fishers in the Gulf of Mexico.

NMFS' Office of Highly Migratory Species Management *may* allow fishers into the closed area if they are willing to participate in experimental modification of gear or practices in order to test gear modifications or alternative fishing practices which are likely to reduce the level of interaction with sea turtles across the entire fishery, *if* NMFS develops or conducts the experiment under the following conditions: (1) A statistically viable experiment is developed to test any number/combination of promising parameters (e.g. prohibiting fishing in the top 15m, use of "shooters" or other means to get the lines quickly to depths below 15m, use of dyed bait, prohibition on use of green light sticks, use of guarded hooks and longer droppers and/or gangion); (2) the experiment is as carefully controlled as much as feasible, and conducted as practicable within statistical limits such as turtle encounter rates, number of fishers available for the experiment, and number of parameters to be tested; (3) an observer must be onboard each such vessel to ensure proper implementation of the experiment; (4) The observer shall provide outreach materials to the captain to assure awareness of the current regulatory requirement to move at least 1 nm if a turtle is encountered, and will report back to NMFS if this requirement is violated; (5) NMFS must analyze the first full year of data within 6 months of the project's initiation, and provide reports on the efficacy of the various options to NER, NER, and F/PR3 Protected Resources staff within the following 8 weeks; and (6) If sea turtle incidental take rates are such that the experiment is clearly not effectively lowering these rates, then NMFS must consult with NER, NER and FAR to determine whether to terminate all or part of the experiment and/or implement the full closure or other requirements.

b. Line-cutting gear

Within 6 months from the time that the SEFSC Pascagoula Laboratory has completed development of a line cutting device, NMFS must promulgate regulations that require the presence and use of dipnets and cutting devices on all longline vessels to make it possible to cut line as close to a turtle as possible in those cases where turtles are too large or conditions are such that boarding the turtle would cause further harm. The team to be convened to develop a stratified random sampling strategy will review the line cutter work from Pascagoula and help determine specifications for both it and the dipnet, prior to finalizing the regulation.

c. Gear Modifications

By January 2001, NMFS must promulgate regulations that require participants in pelagic longline fisheries in the United States Atlantic to use only corrodible hooks. This measure should substantially improve the survival of loggerhead and leatherback sea turtles that are hooked; although to further increase probability of survival, fishers should still be encouraged to remove non-ingested hooks when possible. This requirement will also be beneficial to leatherbacks, which usually are hooked externally and often are too large to bring onboard for dehooking.

d. Monitoring

By January 2001, NMFS, working with the remainder of NMFS' Office of Sustainable Fisheries, the Northeast and Southeast Fishery Science Centers, the respective Fishery Management Councils, Advisory Panels, and Scientific and Statistical Committees, must develop a mechanism for funding observer programs associated with fisheries that use gear responsible for capturing, injuring, or killing loggerhead and leatherback sea turtles. NMFS, working with NMFS' Office of Sustainable Fisheries, the respective Fishery Management Councils, Advisory Panels, and Scientific and Statistical Committees can develop a monitoring method, which would serve as an alternative to observers, that gathers data on the number of loggerhead and leatherback sea turtles incidentally taken by gear in the Atlantic pelagic fisheries for swordfish, tuna, shark and billfish in the U.S. Exclusive Economic Zone after establishing that any alternative provides a level of objectivity and statistical power that is the same as or greater than data collected by independent observers.

Alternative 2

a. Modifications in Fishing Method

By the effective date of the final rule amending the FMP, NMFS must manage all pelagic longline vessels fishing north of 35° N. latitude so they only fish in waters with sea surface temperatures cooler than 64° F. No pelagic longline gear shall be set prior to 10 p.m.; this gear can be hauled during the day, but shall generally be hauled by 1300 hours of the day after it is set. Compliance with this requirement must be monitored throughout the year (via VMS, observers, or other method). Outside this area, due to higher average sea surface temperatures and the daytime fishery targeting yellowfin tuna, fishers should be encouraged (through outreach) to fish colder, deeper waters in as much as this is possible, and to avoid sets near dusk. Fishing colder and deeper in the water column and moving once a turtle is encountered is expected to reduce the number of turtle interactions with the gear associated fishery from current levels.

b. Gear Modifications

By January 2001, NMFS must promulgate regulations that require participants in pelagic longline fisheries in the United States Atlantic to use only corrodible hooks. This measure should substantially improve the survival of loggerhead and leatherback sea turtles that are hooked; although to further increase probability of survival, fishers should still be encouraged to remove non-ingested hooks when possible. This requirement will also be beneficial to leatherbacks, which usually are hooked externally and often are too large to bring onboard for dehooking.

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IV. Incidental Take Statement

Section 9 of the NMFS and Federal regulation pursuant to section 4(d) of the NMFS prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the NMFS provided that such taking is in compliance with the reasonable and prudent measures and terms and conditions of the Incidental Take Statement.

Section 7(b)(4)(c) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under section 101(a)(5) of the Marine Mammal Protection Act of 1972 (MMPA). Since no incidental take has been authorized under section 101(a)(5) of the MMPA, no statement on incidental take of endangered whales is provided and no take is authorized. Nevertheless, NMFS' Office of Sustainable Fisheries must immediately (within 24 hours) notify the nearest NMFS Office of Protected Resources should a take occur.

Amount or extent of take

NMFS believes that the following levels of incidental take may be expected to occur as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. NMFS' Office of Sustainable Fisheries must immediately provide an explanation of the causes of the taking and review with NMFS PR the need for possible modification of the reasonable and prudent measures.

Because of: (1) the current status of the northern loggerhead subpopulation, and of leatherback sea turtles; (2) the Levels of incidental take of the May 1999 biological opinion were exceeded for both of these species; (3) the SEC’s revised estimates of incidental take levels for sea turtles indicates that takes in this fishery over the years have actually been much higher than previously believed; (4) measures proposed by the HMS FMP Amendment may actually increase incidental take levels for sea turtles, and due to the largely unquantifiable nature of most of these potential changes, it is necessary to require additional conditions of Office of Sustainable Fisheries in order to lessen the impact of this fishery upon loggerhead and leatherback sea turtles, and ensure takes decrease in future years. As more becomes known regarding the status of these populations, it may be necessary to implement additional restrictions to further reduce incidental takes.

Therefore, NMFS must implement measures to reduce take of loggerheads and leatherbacks immediately and must reduce the number of individuals of both species that are taken by the fisheries by at least 75% of the current levels by 2001. Take reducing measures for these species should impact take rates for all turtle species, but take levels for Kemp's ridleys, green turtles and hawksbill turtles are not anticipated to change too substantially considering the rarity of these events and that fact that take minimization measures implemented in the northern statistical sampling areas may be less effective at reducing capture rates of these other species, particularly for hawksbills, due to their more southerly distribution and the possibility of effort redistribution into southern areas as a result of the Grand Banks measures.

As noted previously, the number of green and Kemp's ridley that Scott and Brown (1997) and Johnson *et al.* (1999) estimated to have been taken in the fishery probably resulted from misidentifications (Hoey, 1998, Witzell, 1999). It also is likely that the hawksbill reported in Yeung (1999) was misidentified (Witzell, pers. comm.). In subsequent years, sampling much confirm which species are caught by the fishery (see Terms and Conditions 2) and addressed in the analysis.

1. Pelagic Longline Fishery for swordfish, tuna, and shark:

Anticipated incidental take for the pelagic longline fishery for swordfish, tuna and shark: It is hoped that the action proposed by HMS, which may slightly increase take levels of sea turtles, will be more than offset by additional requirements to reduce take, as outlined below, and that estimates of incidental takes of sea turtles in this fishery, which are approximately double previously available estimates, will be substantially minimized by the reasonable and prudent alternatives and reasonable and prudent measures required under this biological opinion. Although much of the year has already passed, the 3rd and 4th quarter periods when the majority of take occurs is still to come, and many take reduction measures could conceivably be in place by that time. Therefore, for 2000, the take levels for loggerheads and leatherbacks anticipated are based on 50% of the average annual estimated incidental level from logbook and observer data reported in Yeung and Epperly (in prep.), for loggerheads and leatherbacks. The annual incidental take levels for animals dead or sustaining life threatening injuries (*i.e.* hooked by ingestion or moribund upon release) are anticipated based on a projected 30% mortality rate and 5% observer coverage (if the required 5% level is not achieved, resulting numbers will be scaled accordingly): In 2001, when take prevention measures can be implemented over the entire year, takes must be further minimized to achieve a total reduction in take of 75% of the current average estimated levels. Take levels for Kemp's ridleys, green turtles and hawksbill turtles are not anticipated to change substantially from current take estimates, because one turtle extrapolated across total effort is the general case. Therefore, anticipated incidental take levels for sea turtles are as follows:

2000:

(a) 358 leatherback turtles entangled or hooked (annual estimated number) of which no more than six (6) are observed hooked by ingestion or moribund when released,

(b) 468 loggerhead turtles entangled or hooked (annual estimated number); of which no more than seven (7) may be observed hooked by ingestion or moribund when released,
(c) 46 green turtles entangled or hooked (annual estimated number) of which no more than two (2) can be observed hooked by ingestion or moribund upon release,
(d) 23 Kemp's ridley turtles entangled or hooked (annual estimated number), of which no more than one (1) can be observed hooked by ingestion or moribund when released, and
(e) 46 hawksbill turtles entangled or hooked (annual estimated number) of which no more than two (2) can be observed hooked by ingestion or moribund upon release.

2001:
(a) 179 leatherback turtles entangled or hooked (annual estimated number) of which no more than three (3) are observed hooked by ingestion or moribund when released,
(b) 234 loggerhead turtles entangled or hooked (annual estimated number); of which no more than four (4) may be hooked by ingestion or observed moribund when released,
(c) 46 green turtles entangled or hooked (annual estimated number) of which no more than two (2) can be observed hooked by ingestion or moribund upon release,
(d) 23 Kemp's ridley entangled or hooked (annual estimated number), of which no more than one (1) can be observed hooked by ingestion or moribund when released, and
(e) 46 hawksbill entangled or hooked (annual estimated number) of which no more than two (2) can be observed hooked by ingestion or moribund upon release.

The proposed action affects only the longline portion of the HMS fisheries, so the levels of incidental take that were anticipated in previous Opinions on HMS fisheries are not expected to change. Therefore, anticipated levels of incidental take for other HMS fisheries remain unaltered (as follows below). However, according to the most recent information available, a shark gillnet fishery may be forming off Alabama. Levels of incidental take for shark gillnet gear anticipated under this Opinion were formed without consideration of this additional effort. If additional effort takes place in this fishery under the purview of NMS (*i.e.* fishers hold a limited access permit for sharks), it must be monitored, and appropriate incidental take levels incorporated into a reinitiated opinion.

2. Anticipated level of incidental take for the shark gillnet fishery:

Based on limited observer data available, NMFS anticipates that continued operation of this fishery will result in injury or mortality of twenty (20) loggerhead sea turtles, two (2) leatherback sea turtles, two (2) Kemp's ridley sea turtles, two (2) green sea turtles, or two (2) hawksbill sea turtles annually. These limits represent the number of total estimated takes (that is, after extrapolating across total effort levels) anticipated for this fishery.

3. Bottom Longline Fishery for Sharks:

Based on the limited observer data available, NMFS anticipates that continued operation of this fishery will result in injury or mortality of twelve (12) loggerhead, and two (2) leatherback, two (2) Kemp's ridley, two (2) green, or two (2) hawksbill sea turtles annually. Because total effort levels in this fishery are unavailable, these limits represent the number of total observed takes (*i.e*. no extrapolation across total effort levels) anticipated. If total effort levels are made available such that total estimates of take are possible, this Level of incidental take will be revised accordingly.

4. Other HMS Fisheries:

As potential for take in other HMS fisheries is low, NMFS anticipates that continued operation of additional HMS fisheries (*i.e.* tuna purse seine, harpoon/hand gear fisheries, hook-and-line, *etc.*) will result in documented takes of no more than three (3) sea turtles, of any species, in combination.

Reasonable and Prudent Measures

Section 7(b)(4) of the ESA requires that when an agency action is found to comply with section 7(a)(2) of the ESA and the proposed action may incidentally take individuals of listed species, NMFS will issue a statement specifying the impact of any incidental taking. It also states that reasonable and prudent measures necessary to minimize impacts, and terms and conditions to implement those measures be provided and must be followed to minimize those impacts. Only incidental taking by the Federal agency or applicant that complies with the specified terms and conditions is authorized.

The reasonable and prudent measures and terms and conditions are specified as required by 50 CFR § 402.14 (i)(1)(ii) and (iv) to document the incidental take by HMS fisheries and to minimize the impact of that take on sea turtles. These measures and terms and conditions are non-discretionary, and must be implemented by the NMFS in order for the protection of section 7(o)(2) to apply. NMFS has a continuing duty to regulate the activity covered by this incidental take statement. If the NMFS fails to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of the incidental take, NMFS' Office of Sustainable Fisheries must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement [50 CFR 402.14(i)(3)].

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of listed species considered in this Opinion:

1. NMFS must implement educational programs for fishers which are aimed at reducing the potential for serious injury or mortality of hooked turtles.

2. NMFS must ensure that monitoring of HMS fisheries will (1) detect adverse effects resulting from HMS fisheries, (2) assess the actual level of incidental take in comparison with the anticipated incidental take documented in this opinion, (3) detect when the level of anticipated incidental take is exceeded, and (4) determine the effectiveness of reasonable and prudent measures and their implementing terms and conditions.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, NMFS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. Terms and Conditions Required for the Pelagic Longline Fishery:

(a) The April 1997 and May 1999 biological opinions required outreach via fishermen workshops. A number of such workshops were held, but attendance was low and they did not seem to be an effective outreach tool for this particular fishery. Therefore, in lieu of these fishermen workshops, NMFS must finance, and work with F/PR, NER and NER in developing and supporting an outreach program to be implemented by a Protected Species Outreach Coordinator. Outreach efforts must include dockside fisher education patterned after the NER's ALWTRP outreach program, including; production and distribution of outreach materials; and staff assistance/expertise as needed in development of outreach materials; education and encouragement of fishermen to use the suite of take reducing parameters outlined in the reasonable and prudent alternatives above, as well as any new ideas/developments which appear worthy of implementation. A preliminary evaluation of this approach must be conducted, in consultation with F/PR, NER and NER, within 12 months of the effective date of this amendment.

(b) Observer coverage: As in previous consultations, 5% coverage in the pelagic longline fishery is still required. Additionally, a final recommendation of the AOCTRT was to increase observer coverage in this fishery, to provide more accurate data on levels of protected species bycatch. However, it is not presently known, considering the low encounter rates between this fishery and some protected species, whether better precision of protected species bycatch estimates could be achieved at a reasonable cost in this large fleet. In this regard, NMFS must convene a team, to include both the NE and SE observer programs and other experts as appropriate, to develop a stratified random sampling scheme that will adequately sample the fishery to determine levels of protected species takes.

This sampling scheme must be developed within 3 months of implementation of this rule, with the resulting scheme being implemented within the following 3 months. At a minimum, the regime must ensure that sampling occurs annually at a reasonable level of coverage within all statistical areas fished. If necessary to comply with the requirements of the International Convention for the Conservation of Atlantic Tunas or achieve adequate sampling for either HMS or protected species, this scheme may be separate or supplemental to the HMS sampling program. This team will also work to develop a better data collection strategy designed to answer critical questions regarding possible ways to limit sea turtle bycatch (e.g. recording not only what color of light stick is used, but also, where on the gear/in the water column it is used, and the same for the takes relative to the nearest buoy), improve species ID, and improve ability to assess survivability.

(c) NMFS must record information on the condition of sea turtles and marine mammals when released as well as describe *in detail* the interaction with the gear (*i.e.* entangled (where, and to what extent), ingested hook, internal or external hook). Photographs must be taken and species identity must be confirmed as well as release condition. Collection of these data are critical to accurately monitor incidental take levels and assess mortality levels of sea turtles in this fishery. NMFS must ensure that when protected species are taken, dealing with each such animal (*e.g.* releasing, resuscitating, PIT tagging/scanning for PIT tags, collecting a full suite of samples (per instruction of the SEC sea turtle coordinator), *etc.*) must be the observer's sole priority.

(d) NMFS must ensure that observers associated with the HMS fisheries collect tissue samples from sea turtles caught in the fisheries and ensure that these tissue samples are analyzed to determine the genetic identity of individual turtles caught in the fishery. To fulfill this requirement, NMFS must ensure that observers associated with the HMS fisheries are equipped with the tools, supplies, training, and instructions to collect and store tissue samples and that the Northeast and Southeast Fishery Science Centers are funded to analyze those samples.

(e) In the draft FMP, NMFS has committed to analyzing the effects on marine mammal bycatch, of limiting the length of pelagic longline gear in the Mid-Atlantic Bight area to 24 nm. NMFS must also analyze effects of this restriction on resulting bycatch of sea turtles. This analysis must be completed within one year of publishing the final rule implementing the proposed action.

2. **Terms and Conditions for the SE Shark Gillnet Fishery:**

(a) VMS cannot be used to replace observer monitoring for any strike-netting effort which may take place within the southeast right whale calving ground closure area, and observer coverage necessary to monitor incidental take levels for sea turtles, as outlined above, must be maintained year-round. NMFS Office of Sustainable Fisheries should investigate new VMS technologies and incorporate advances such as added video technology as practicable. Eventually, good video technology could possibly eliminate or at least greatly reduce the need for observers.

(b) With respect to the SE shark gillnet/strikenet fishery, the April 23, 1997 biological opinion required that regulations be promulgated to prohibit setting gear in this fishery within 3 nm of a listed whale sighting and, if a whale is sighted within that range, require nets or lines to be hauled back immediately. Both the observer and the vessel operator will be responsible for sightings of whales. If any listed whale is taken in gear, the vessel operator must contact NMFS (nearest Regional Office) and cease all fishing activities immediately. This requirement was partially fulfilled via the May 1999 rule implementing the HMS FMP. However, current ALWTRP and HMS regulations do not specify the party responsible for sighting whales, nor do they clearly indicate that the vessel operator must contact NMFS and cease fishing in the event of any take of listed whales. NMFS (F/PR) must ensure that the ALWTRP is amended accordingly, and HMS must adopt this provision as a requirement under the FMP, the next time these rules are revised.

(c) NMFS must ensure the outreach coordinators described above work to ensure *all* shark gillnet fishermen are educated on gear handling techniques and protocols to deal with entanglements and protected species in general, to reduce the potential for serious injury or mortality should an entanglement occur. Recommendations from the AOCTRP and the ALWTRP should be followed in the development of these programs. Full implementation of this alternative will help avoid jeopardy because, although it may not prevent an entanglement, the potential for serious injury or mortality would be significantly reduced.

(d) NMFS must provide F/PR, NER and NER with accurate effort data for *all* gillnet effort (regardless of type) directed at sharks. This is necessary to better determine actual effort levels in the gillnet components (*e.g.* strike and driftnet) of the fishery in order to better understand how much gillnet effort occurs in this area, in general (for improved sea turtle take estimates), to better understand what effort levels may still be occurring in the area during right whale season, and to facilitate monitoring of compliance with requirements under the ALWTRP and this rule regarding mandatory 100% observer coverage of the fishery (or the VMS alternative outlined above) during right whale season. This must be provided annually.

(e) Observer coverage is required and shall be sufficient to produce statistically reliable results to evaluate the impact of the fishery on sea turtles, including appropriate seasonal coverage. Observers will collect information to: (i) facilitate the understanding of the dynamics of the interaction with sea turtles; (ii) evaluate possible relationships between gear type/fishing strategies and turtle interactions; and (iii) better understand the population structure, status, and life history of turtles incidentally taken by the fishery. Information on the condition of sea turtles (and marine mammals) when released must be reported for each turtle observed. Photographs must be taken to confirm species identity and release condition. Data collection improvement protocols developed under Term and Condition 1(b) above shall be implemented for this fishery as well. Additionally, quarterly and annual reports summarizing protected species bycatch data collected for this fishery shall be prepared and disseminated in a timely fashion to NER, NER, and F/PR Protected Species Programs. Annual reports shall include extrapolations of total take for each species across the entire fishery (see 4 (c) below for details).

(f) As identified earlier, it is customary in the shark fishery for fishermen to check the length of the net every 0.5 -2 hrs with a spotlight to check the net and catch. Fishermen must be instructed to look for sea turtles and marine mammals during those checks and remove any protected species from the net immediately. Continuing education of fishers to ensure implementation of this condition will be accomplished by the outreach coordinators identified in RPM no. 2. above.

3. Terms and Conditions for the Bottom Longline Fishery for Sharks:

(a) NMFS must continue to implement an observer program or ensure that financial support is provided to fund an external program such as the previous MARFIN-funded study, to monitor incidental takes of listed species in the bottom longline fishery for sharks.

(b) Within 12 months of this the signature date of this biological opinion, NMFS must implement a mechanism for estimating total effort levels in this fishery in order to provide accurate estimates of sea turtle bycatch. Data collection improvement protocols developed under Term and Condition 1(b) above shall be implemented for this fishery as well. Additionally, quarterly and annual reports summarizing protected species bycatch data collected for this fishery shall be prepared and disseminated in a timely fashion to NER, NER, and F/PR Protected Species Programs. Annual reports shall include estimates of total take for each species across the entire fishery (see 4 (c) below for details).

4. **Terms and Conditions Applicable to All HMS Fisheries:**

(a) Within 3 months from the effective date of the action, NMFS must ensure that observers associated with the HMS fisheries collect tissue samples from sea turtles caught in the fisheries and ensure that these tissue samples are analyzed to determine the genetic identity of individual turtles caught in the fishery. To fulfill this requirement, NMFS must ensure that observers associated with the HMS fisheries are equipped with the tools, supplies, training, and instructions to collect and store tissue samples and that the Northeast and Southeast Fishery Science Centers are funded to analyze those samples.

(b) NMFS must continue to distribute appropriate sea turtle resuscitation and handling techniques found in 50 CFR part 223.206(d)(1), as follows:

> "Resuscitation must be attempted on sea turtles that are comatose or inactive but not dead by placing the turtle on its breastplate (plastron) and elevating its hindquarters several inches for a period of 1 hour up to 24 hours. The amount of the elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Sea turtles being resuscitated must be shaded and kept wet or moist. Those that revive and become active must be released over the stern of the boat only when trawls are not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels."

Within 6 months of the effective date of this Final Rule, NMFS must issue a regulation requiring that all vessels permitted for HMS fisheries post the sea turtle handling guidelines inside the wheelhouse (to ensure that the owner passes it on to the captains and that it can be referred to as needed). Continuing education of fishers to ensure full implementation of this condition will be accomplished by the outreach coordinators identified in RPM no. 2. above.

(c) A report providing sea turtle take estimates based on observed takes must be prepared annually. The report must provide species specific take estimates as well as an overall estimate of total sea turtle take. This report must also include data on the condition of each individual sea turtle, in order to obtain better data on the level of impact that this fishery may be having with respect to post-release survival. These data should include information on where the animal was hooked or otherwise entangled, depths of imbedded hooks, and actual written comments by the observers. In this regard, observer data coordinators must consult with protected resources staff in HQ, NER and NER to ensure data collected is sufficient in detail to accomplish this goal. The report must be forwarded to the Chief of Endangered Species, Office of Protected Resources and copied to the Assistant Regional Administrators of the Northeast and Southeast Region Protected Species Programs.

Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

(1) In order to better understand sea turtle populations and the impacts of incidental take in HMS fisheries, NMFS should support inwater abundance estimates of sea turtles to achieve more accurate status assessments for these species and improve our ability to monitor them.

(2) Once reasonable inwater estimates are obtained, NMFS should also support population viability analyses or other risk analyses of the sea turtle populations affected by HMS fisheries. This will help improve the accuracy of future assessments of the effects of different levels of take on sea turtle populations.

(3) NMFS should ensure that the *Sea Turtle Handling Guidelines* are translated into several languages (*e.g*. Portuguese, Spanish, Italian, Greek, *etc.*), printed, and distributed throughout the longline fisheries operating in the North Atlantic and Mediterranean in order to enhance survival of all turtles/subpopulations hooked, even those taken by foreign countries (as these fisheries all impact U.S. nesting populations.)

(4) NMFS is supporting a directed study in the Azores to examine sea turtle capture rates related to hook type, bait type, and presence/absence of light sticks. Within 12 months of receipt of adequate information from the Azore's study, NMFS, in coordination with the NEFSC and SEFSC sea turtle programs, should review this information and that provided by Hoey (1998) to assess whether additional gear modifications or other changes in current fishery practice are warranted, or whether need for additional data warrants conducting a similar or modified study in the north Atlantic longline fishery. Hoey’s (1998) review of observer records showed a disproportionate number of turtle interactions in the Grand Banks as opposed to other management areas. This area possibly could provide adequate sampling for sea turtle interaction, to test these additional measures.

(5) Term and Condition no. (5) of the longline component of the May 29, 1997, Opinion required NMFS to determine what level of reduction in light sticks could be achieved while allowing the fishery to continue. This was based on past research indicating the great increase in potential for takes of sea turtles to occur when light sticks were used in the fishery (Witzell and Cramer, 1995). However, Hoey’s 1998 analysis of Atlantic pelagic longline observer data from 1990 - 1996 indicated that the use of light sticks had little bearing on levels of sea turtle bycatch. Studies by Wang *et al.* (1999) indicate a strong attraction to green light sticks and possibly a weak attraction to yellow light sticks. F/PR will help NMFS' Office of Sustainable Fisheries obtain scientific expertise in interpreting these conflicting results. NMFS should provide a summary report of the experts’ recommendations and, in consultation with F/PR, NER and NER, determine whether additional action with respect to light stick use in this fishery should be considered. Although not yet tested on pelagic phase loggerheads, the Wang *et al.* (1999)

data may suggest a strong enough correlation with orientation toward green light sticks to warrant experimental prohibition of their use.

(6) If NMFS does not implement an experimental fishery associated with Reasonable and Prudent Alternative 2(a) above NMFS should investigate alternative ways of developing fishery management measures that minimize the impact of HMS fisheries on sea turtles.

Reinitiation of Consultation

This concludes formal consultation on implementation of the Final Highly Migratory Species Fishery Management Plan. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered (i.e., proposed quota reduction and limited access rules are changed), (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the Biological Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action. If the amount or extent of incidental take is exceeded, NMFS' Office of Sustainable Fisheries must immediately request reinitiation of formal consultation.

As discussed in the *Conservation Recommendation* section of this Opinion, NMFS is supporting a directed study in the Azores to examine sea turtle capture rates related to hook type, bait type, and presence/absence of light sticks. Within 12 months of receipt of adequate information from the Azore's study, NMFS, in coordination with the NEFSC and SEFSC sea turtle programs, should review this information and that provided by Hoey (1998) to assess whether additional gear modifications or other changes in current fishery practice are warranted, or whether need for additional data warrants conducting a similar or modified study in the north Atlantic longline fishery. The Office of Protected Resources will consider the results of this report as new information that may reveal effects of the HMS fisheries that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion.

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Appendix I: Section 7 Requirements for HMS Fisheries under April 23, 1999 BO – Compliance Assessment UPDATE...

Tasking Source	**Objective**	**Fishery**	**Responsible Party**	**Deadline**	**Task**	**Status**
5/29/97 BO – R &PA		All	F/SF		Inform F/PR of RPA implemented	Memo sent from Matlock stating that DGN fishery will be closed.
5/29/97 BO – R &PA	**I.** Prohibit use of DGN in all HMS fisheries	DGN - general	F/SF		Issue regulation prohibiting gear-type	Complete except SE Shark gillnet fishery (but is restricted under ALWTRP).
5/29/97 BO – **Or:** R &PA	**II.** Allow restricted use of DGN	DGN - general	F/SF	immediately	Various, as noted below	See breakdown below
“ ” “	Prevent jeopardy	Shark Gillnet (now)	F/SF	immediately	Require all DGN vessels to cease fishing if whale is injured/killed	**Need to ensure inclusion of this measure in outreach efforts with SE shark gillnetters.**
“ ” “	“ ”	All DGN (Now shark)	F/SF & F/PR	**By Nov. 1, 1999**	Workshop - whale & turtle release techniques	Partially implemented by SER. **Workshop focused on this purpose still needed.**
“ ” “	” “	Shark gillnet	NMFS	immediately	Seasonally close areas to gillnets per ALWTRP	Accomplished under rule implementing ALWTRP; HMS adopting under MSFMA in proposed rule.
“”“	” “	Shark Gillnet (now)	NMFS	“ ”	100% observer coverage Nov 15-Apr 1	Was implemented for SWO; is being implemented for sharks – **Need to take measures to monitor compliance (e.g., work with FDEP to confirm effort levels).**

“ ” “	” “	Shark – strike nets	F/SF, F/PR	immediately	Require use of spotter planes, prohibit use at night or in poor visibility.	Implemented under ALWTRP rule; to be adopted under MSFMA under HMS proposed rule.
“ ” “	” “	DGN - swo & tuna	F/SF	immediately	Implement limited access, permanently eliminate derby fishery	Component of proposed rule.
Terms and Conditions of ITS in 5/29/97 BO	Monitor takes	LL	F/SF	immediately	Maintain a minimum of 5% observer coverage	Not fully attained in ‘98; will be in ‘99.
“ ” “ ” “ ” “ ”	Assess release condition; confirm sp. ID	All	F/SF, SEC	immediately	Report condition of turtles released; Photo-document	??? **Need to ensure data are recorded and available in electronic format.**
“ ” “ ” “ ” “ ”	Improve accuracy of protected species monitoring	LL	F/SF	?	Team - evaluate NEC and SEC observer coverage for adequacy for protected resources	LL Advisory Panel considered on 12/9/97; found inadequate –**Need to review NEC analysis; determine feasible level of improvement.**
“ ” “ ” “ ” “ ”	Improve survival of hooked turtles	LL	F/SF	begin by 9/98	Workshop - turtle resuscitation and handling techniques	Conducted fall/winter ‘98. May be voluntary in future. **Compliance/cooperation needs to be improved upon in future.**
“ ” “ ” “ ” “ ”	“ ” “ ” “	LL	F/SF	immediately	Distribution - turtle handling techniques	FAX network 2/10/98 & 3/5/98; HMS ID Guide

" " " " " " " "	" " " " "	LL	F/SF	complete by 9/98	Team - review existing turtle handling guides, produce/distribute pamphlet	Completed
" " " " " " " "	" " " " " " " "	LL	F/SF	completed by 9/98	Team - review management options to reduce turtle takes	Studies still ongoing – **Need to monitor progress, continue to review management options as they become available.**
" " " " " " " "	I. Minimize impacts of LL fishery	LL	F/SF, F/PR	begin by 1/98	Study - loggerhead turtle pop. genetics	A study of loggerheads taken in the Med. LL fishery was initiated by Alan Bolton. **Need to continue study, develop sampling protocol in coord. w/SEC, HQ, regions.**
" " " " " " " "	" " " " " " " "	LL	F/SF	complete by 12/98	Study - reducing light sticks	Hoey analysis completed...**other conflicting analyses need assessing and review in light of Hoey results.**
" " " " " " " "	" " " " " " " "	LL	F/SF	As data become available following implementation of DGN prohibition.	Determine whether DGN prohibition results in increased LL effort. Report to PR – Reinitiate if yes	DGN prohibition only recently proposed. **Need follow-up within 3 months after end of first fishing year following implementation of prohibition.**
" " " " " " " "	Minimize takes in gillnet gear	Shark gillnet	F/SF	immediately	Instruct fishers to check & remove protected resources when checking net	**Need to ensure inclusion of this measure in outreach efforts with SE shark gillnetters.**
" " " " " " " "	" " " " "	All	F/SF	immediately	Distribution - turtle resuscitation techniques	Has been accomplished.

" " " " " " " "	Monitor takes	All	F/SF	Sept and Mar	Analyze observer data and submit to PR, NER, SER. Meet w/Centers to develop protocol.	???
" " " " " " " "	" "	ALl	F/SF	Quarterly	Submit reports listing observed takes, including observer codes and comments, to F/PR, NER and SER.	Reports are being sent to SEC. **Need to ensure timely distribution to HQ, NER, SER**
Conservation Recommendations	Consider limiting access to the Atlantic tuna fisheries	LL (DGN)	F/SF		Consider limited access for tuna fisheries	Proposed for BAYS stocks under HMS rule.
July 10, 1998 Amendment ...Term and Condition	Monitor take levels	Shark gillnet	F/SF, SEC	Establish by July 1, 1998	Mandatory observer coverage at statistically reliable levels (37 sets min. in '98). Data collection as detailed in BO.	Observer program established – limited number of call-ins (9) prevented achievement of 37 set min. requirement. **Need to consult w/F/PR and SEC regarding level necessary in '99.**
" " " " " " "	Reporting	Shark gillnet	F/SF, SEC	Annually, by Dec 31	In coordination with Regional Offices, submit report to F/PR	No Regional coordination, but report prepared and submitted to HQ (late). **Need to ensure better coordination and distribution of report in future years.**

Appendix II. Summary of Fishing Gears Used to Target Highly Migratory Species

Fishing Gear	**Definition of Gear**	**# of Vessels**
Tuna Purse Seine	A floated and weighted encircling net that is closed by means of a drawstring threaded through rings attached to the bottom of the net.	5
Harpoon (BFT and swordfish)	Fishing gear consisting of a pointed dart or iron attached to the end of a line several hundred feet in length, the other end of which is attached to a floatation device. Harpoon gear is attached to a pole or stick that is propelled only by hand, and not by mechanical means.	Approximately 7,500
Commercial Rod and reel, handline	*Hook and line*: One or more hooks attached to one or more lines. *Handline*: fishing gear that is set and pulled by hand and consists of one vertical line to which may be attached leader lines with hooks.	Approximately 20,000
Recreational Rod and reel, handline (all HMS)		
SE Shark gillnet	275-1800 m long and 3.2-4.1 m deep, with stretched mesh 12.7-29.9 cm (or stretched mesh >5 inches according to Large Whale Take Reduction Plan regulations), used to fish for sharks in the SE (FL and GA coasts)	12-15
Driftnet*	A gillnet that is unattached to the ocean bottom, whether or not it is attached to a vessel, used to target for large pelagic species.	12-15 prior to January 1999 prohibition in the swordfish fishery
Pelagic Longline (all HMS)	A suspended monofilament longline with greater than 3 hooks or leaders that is supported along its length by floats and is marked on the surface by hi-flyers.	198 (directed swordfish fishery) 218 (incidental swordfish fishery)
Bottom Longline (Sharks)	A monofilament longline with greater than 3 hooks or leaders that is maintained on the ocean floor along its length by weights and is marked on the surface by marker buoys and/or high-flyers.	211 (directed shark fishery) 578 (incidental shark fishery)

* Please note that coastal gillnet fishery (40 vessels) fishes closer to shore, uses smaller mesh than the traditional swordfish driftnet fishery, and is not an HMS directed fishery. Small tunas are caught incidentally by this fishery, which targets bluefish.